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April/May 1985

ZX COMPUTING

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Group Editor: Wendy J Palmer
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Advertisement Manager: Barry Bingham
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Publishing Director: Peter Welham
Chairman: T J Connell

Cover Design
MM DESIGN Tel: 01 631 3888

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CONTENTS



ASP FIGHTS SOFTWARE PIRACY

Much has been said and written in condemnation of software piracy but few have taken a positive stand against it. ASP is among those few that have taken action to help curb the grave problem of home copying of commercial software.

ASP has already taken steps to eliminate advertisements in our magazines which relate to tape duplication for piracy purposes. While it is appreciated that individuals may take 'back-up' copies of their own programs, it should be noted that it is *ILLEGAL* to copy commercially available software for other than personal use.

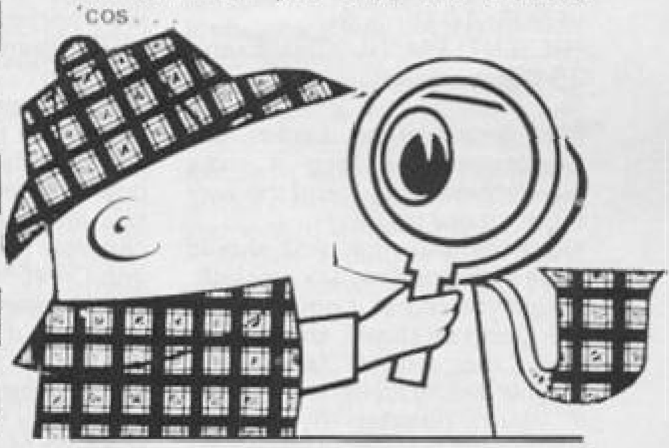
Software piracy is costing the software industry huge sums of money which is detrimental to the future development of the industry. It is in everybody's interests to dramatically reduce the level of software piracy primarily because firms need funds raised from software sales to plough back into research and development of new products. This means that the standard of software products can only improve.

ASP hopes our action will help combat this serious problem in order to maintain and improve the high standards of the UK software industry. We are asking *you* to do the same by refraining from duplicating or copying commercially available software for anything other than personal use.

MPUTING

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ZX Computing is constantly on the look-out for well-written articles and programs. If you think that your efforts meet our standards, please feel free to submit your work to us for consideration for publication.

All submitted material should be typed if possible; handwritten work will be considered, but please use your neatest handwriting. Any programs submitted should be listed, a cassette of your program alone will not be considered. All programs must come complete with a full explanation of the operation and, where relevant, the structure; Spectrum programs should be accompanied with a cassette of the program as well as the listing.

All submissions will be acknowledged and the copyright in such works which will pass to Argus Specialist Publications Ltd will be paid for at competitive rates. All work for consideration should be sent to the Editor at our Golden Square address.

WELCOME

A few weeks ago a furtive character crept into our office and offered us world rights on what he described as an explosive document. Demanding only that we referred to him as "Redgie" (I think that's what he said, but with his scarf around his mouth it was rather muffled), he paused only to wave his pipe at us before disappearing down the lift shaft (we really must get the lift fixed, or at least put up a warning notice).

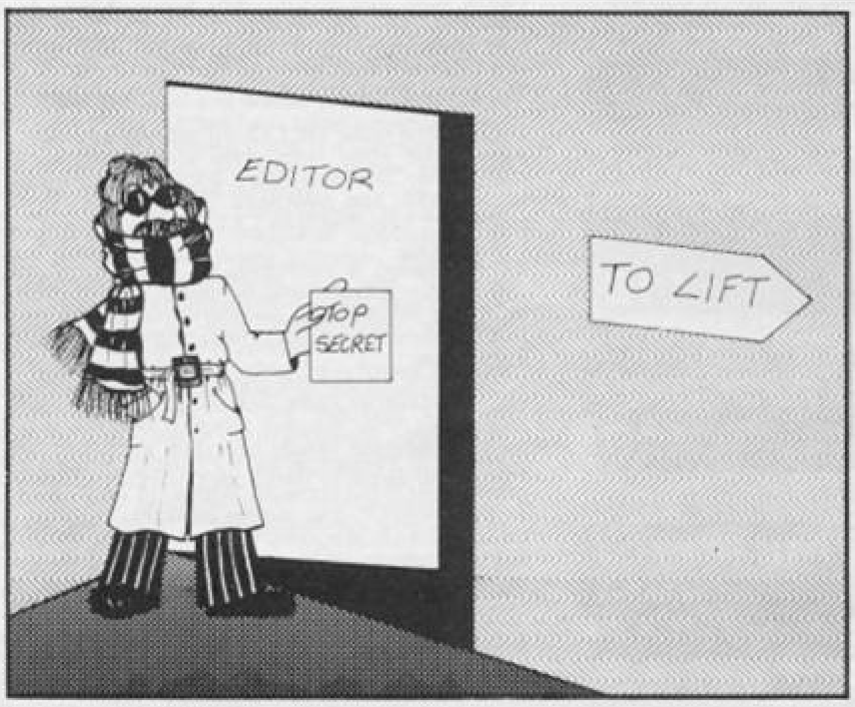
It is after lengthy consideration and deep heartsearching for what must have been at least twenty seconds, that we have decided to publish extracts from this document for, although we have no idea who the persons involved were (as some sort of code was used), the public has a right to know!

Minutes of the All Party Emergency Meeting and Debate.
DATE: 10.11.80
VENUE: 10 D'n'g St.
PRESENT: PM, NL (Chn. Exch), DS (Lib.),

PM: Order, order, Ladies and Gentlemen, we face a crisis which threatens to rend the very fabric of our society!
NL: I told you that you should have supported my tax on cloth. I hope you regret it now.
DS: Don't be stupid, she doesn't mean that kind of fabric. The trouble would have never arisen if you'd passed my bill on limiting the powers of landlords.
PM: Be quiet both of you, you're both wrong (strikes both across the knuckles with a ruler). In the next few years our policies are likely to cause massive unemployment, what we need is something to distract the general public from this situation.
NL: We could import a few missiles from the USA and . . .
PM: No, people aren't bothered any more. No-one will ever even hear of "you know where" Common, all those marches and protests are a thing of the past.
NL: I wasn't going to suggest that, if you'd only let me finish but you always interrupt me, so just for that I'm not going to say — so there!
PM: I'm sorry, come on, tell us please. Pretty please?
NL: Oh all right. I was going to say, get a few missiles and . . .
DS: Sell them to Argentina! Great idea, they're always friendly and cooperative, and then get them to attack Brazil, we'll spread a rumour that they plan to dump their excess coffee on them . . .
NL: (Stamping his foot) No. No. I have been trying to suggest we blow up Manchester. That'll cut down the population, and those still left who are unemployed can clear up the mess as a sort of Job Creation Scheme.
PM: Ummm. It's an idea, but I think we'd have problems with the unions, employing people on a short term basis and not providing any training. And think of the cost of supplying protective clothing, we'd never get away with blaming radiation sickness on the smoke from the factories.
DS: Couldn't we provoke a strike in a major section of the nationalised industries, say the Steelworkers or something? That's always good for a few months distraction!
PM: Yes, but we need something more permanent. I've taken the liberty (mutters of poor old D) and invited the best brain in Britain to join us, he should be here by now, anyway I've informed him of the problem and the combined force of MENTAL have been working on it.
(There is a knock on the door, CS enters.)
CS: Sorry I'm late, this black watch of mine seems to be playing up.
PM: Well man, don't hang about, what have you to suggest?
CS: A project so incredible, so awesome, so immense . . .
ALL: Yes?
CS: So brilliant, so unique, so fantastic . . .
ALL: YES, YES?
CS: So devious, so utterly and amazingly ingenious . . .
ALL: Get on with it!
CS: We'll get the general public hooked on COMPUTERS!
PM: Is that it?
CS: Yes, isn't it so wonderful, so absolutely . . .
ALL: Shut up!
DS: But, I mean, how? Those things take up a whole room, cost a fortune and we'd have to train everybody to get a degree in maths.
CS: No, I can invent a machine which will be cheap, small enough to carry and relatively simple to use.
PM: (Laughing hysterically) Oh yes, and I suppose it'll work with normal home equipment like a TV and a tape recorder!
CS: Now there's an idea!
PM: And what do you want for this service?
CS: Oh, I'm not fussy, I fancy one of those three wheeled cars, they look so cute!
PM: If you succeed I'll give you a knighthood.

(All the others present collapse with laughter and mutter things like "Don't tease him M.")
PM: Well off you go, and don't call us, we'll call you.
(CS exits, all those present roll around on the floor laughing, eventually PM stops, sits up and calls meeting to order.)
PM: Well we aren't going to get any help there, let's have a look at your missile idea again N.

Here the paper ends in a burnt, charred edge as if someone has tried to set fire to it.



Back to reality!

First I would like to welcome Cliff Joseph, who has joined us as my assistant and is working frantically to keep my extremes under control. I'm sure we all hope his time with us will be long and enjoyable.

Inside

This issue includes a special feature on computer adventuring, a part of computing which has grown rapidly over the last year or so, but we have not sacrificed any of the other areas to produce it. You'll find the whole gamut of program listings to enter, from Arcade to Utilities for all the Sinclair machines, Reviews, Articles, News and of course a great Competition!

So, can you afford to merely read the editorial while standing in the newsagents? NO! Take it home and peruse these pages at leisure.

Thanks

To a local shop, Minehead Radio for lending me a QL for a couple of weeks (I must admit to really liking that machine), a super BASIC and nice Wordpro. However, before I could discover more the colour went and the microdrives developed a fault. Haven't we been here before?

And now all that remains is to pack up your troubles in your old kit bag and over the top me lads and into the fray . . .

Shuffling slip

Dear *ZX Computing*
I was happy to see that you had published my letter (Faster Shuffling, Dec/Jan 85), but disappointed to find two misprints, especially the one in the vital line of the program. The correct versions are:

Text: 3rd para, line 8: 'Q=52 and'

Program: Line 130 IF RND *-Q >=N THEN GOTO 110
Yours sincerely
W. E. Thomson

How to play Valhalla

Dear Sirs,
I live in Sao Paulo, Brazil, and I have a ZX Spectrum that I bought in Germany. I also have some software, including the Valhalla game, released by Legend Productions.

As a matter of fact, I'm writing to you because of this game. In its manual, on page 11, mention is made of computing magazines that "provide help corners to keen adventurers".

I do need help, because I can't go further; I made a map and found out the position of 27 locations, but now I'm going in circles, and in spite of having played for several hours I've not found Ofnir yet, and this is the first step of the game. As you can imagine, it is very difficult and expensive to buy foreign magazines here in Brazil (most of them do not come regularly): therefore I ask you to please send me some hints on how to play Valhalla, or please ask your readers if they can send me this information. Maybe there is a book or specific magazine with hints and auxiliary information about Valhalla?

Please rush your answer (before I get totally crazy) to the following address:
Alexander Gromow
P.O.Box 18507
01000 Sao Paulo — SP
BRAZIL
With my best regards I remain,
Sincerely yours
Alexander Gromow

Printer Commands

Dear Mr. Elder,
I was very interested to read Mr. Meikle's letter, which was published in the August issue of *ZX Computing,* concerning the Kempston Centronic Interfaces. As I now have both the standard and the 'E' interfaces, I thought you might be interested in my own experiences.

The problems started when I purchased a Star DP15 printer, and connected it to my 48K Spectrum with the standard Kempston interface. I found that, although I could transmit all the printer commands, including multiple ones, certain of these could not be switched off. Eventually, I found that by sending the initialisation command, the desired result could be obtained, but that this also executes a line feed. I also found that it was not possible to transmit graphics to the printer. The Kempston people, who were most courteous and helpful, advised me that this was due to differences in the ASCII character sets of the computer and the printer. As a direct consequence of this, I decided to purchase the 'E' interface.

After my initial delight at being able to send graphics to the printer and produce screen copies four times the normal size, I found that the interface just would not transmit multiple printer codes, even though Kempston say that it does. I believe that this must be possible, but have not yet been able to find the method. This is probably due to the poor instructions which accompany both the printer and interface, a common fault with a lot of peripherals and software. Any suggestions *please?*
Yours sincerely
J. F. Tydeman

Can anyone help? Unfortunately Kempston ask for all their review samples to be returned, so we can't investigate — Ed.

Metplot conversion?

Dear *ZX Computing*
In your October/November edition you published a program called Metplot written for the ZX-81 by David Lockyer. I spent many hours typing in the program, which I may say looked particularly impressive, and was on the final column of the commands having completed the input of the map of the U.K. when my dodgy old RAM pack finally gave up the ghost. I have decided after much heart searching to commit my dear old, non-loading '81 to science and buy a Spectrum, although it will be a mite strange to walk into any computer shop and buy software with ease instead of that intake of breath and the depressing words of "No mate, there's no call for ZX81 programs anymore." I will no longer have to suppress the urge to stab the smug assistants.

There are two questions I would like to ask you or your readers

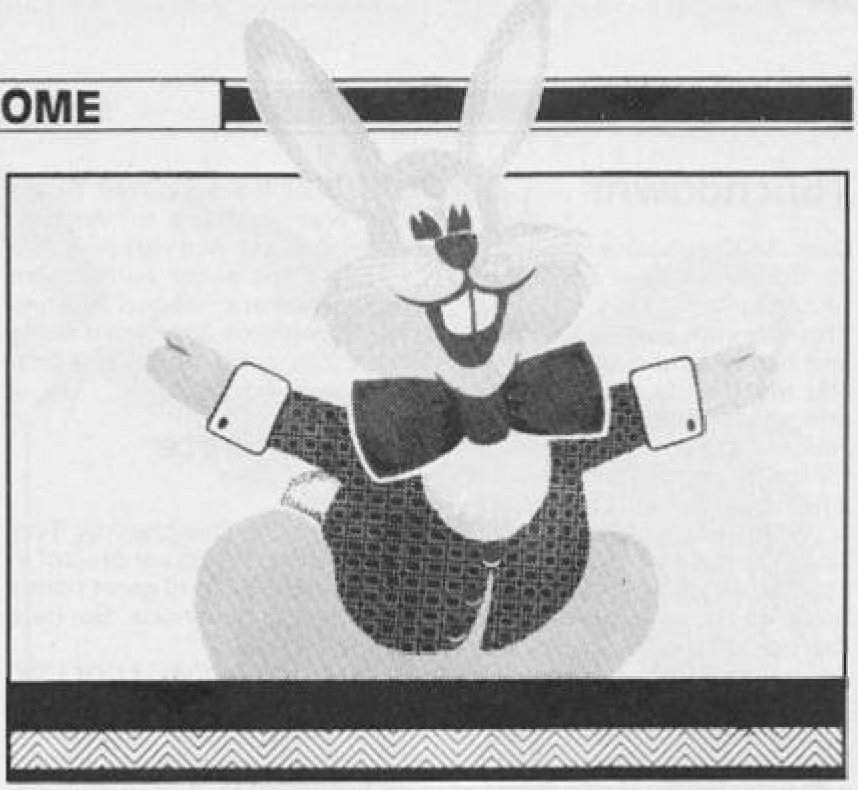
1. Is it possible to alter the Metplot program to use it on the Spectrum?

2. I have a fairly extensive range of software both homemade and commercial that are written in BASIC. I recall sometime ago reading about a program called Slowloader that translated 81 programs into Spectrum ones. I wonder if you have heard of the program, where I can get it and does it work? I would be heartbroken to leave the lands of the Black Crystal unexplored or have to pay another "tenner" for the same program.

An error published in Metplot was that the array DIM D$ (32) on line 30 should have read DIM D$ (72).

Trying not to grovel too much I would like to say that as a disillusioned ZX81 owner I would like to say that your magazine is the only one that has remained true to us early Sinclair pioneers. As others have destined the ZX-80 and 81, both of which I have possessed to an untimely demise you have plodded on, unheeding of the rabble and have in my experience built up a reputation of a Magazine that is interested in supplying information rather than advertising endless Spectrum games that make the ZX-80 and 81 owners feel like a Mediaeval Knight in a Space Invader game.
Yours faithfully
Robert Ager

Now there's a project! Anyone out there converted Metplot? Secondly, I'm afraid the Slowloader only worked with Issue 1 and 2 Spectrums, and is now obsolete. But welcome to the Spectrum club anyway — Ed.



Apologies

To Thurnall (NOT Thurnell) Electronics, for neglecting to mention their address and telephone number along with the other details in the Disk Drive competition. Thurnall can be contacted at:

Thurnall Electronics Ltd.
95 Liverpool Road,
Cadishead,
Manchester M30 5BL
Phone: 061-775 5416

Compac

Dear Editor
I think the program 'COMPAC' for the ZX81, by Rogers and Hogg in your October/November issue was fabulous. I especially appreciated the documentation given for the program, and I'm sure many readers will find new techniques for programming because of this documentation.

I also think these two programmers are geniuses, and should be commended for their excellent work. Unfortunately, I do not own a joystick the full enjoyment of this program.

Whilst typing it in, I came across eight errors in your magazine.

1) HEX LOADER PROGRAM, page 5; five REM lines should be listed, not four.
2) HEX LOADER PROGRAM: it appears to me that the last line of HEX DUMP was printed by mistake.
3) LINE 250: add inverse minus after inverse MAZE.
4) LINE 265: change the spaces to '. . '.
5) LINE 9999: 32 graphic characters #131 (graphic shifted 6) must follow the semicolon after ESSENTIAL.
6) Customising column page 102, second paragraph: I believe that the last line should be; < 4 THEN GOTO 20.
7) Customising column, third paragraph: lines to change are lines 7, 10 and 420.
8) The BASIC column: #110 CHR$21 should be CHR$131.

Yours truly
Walter Bader
USA

Touchdown!

Dear *ZX Computing*
Re: Spectrum game Touchdown (June/July).
This program is very enjoyable, and has been played by myself and my friends many times. It proved so difficult at first, that I constructed a simplified version for the beginner, by allowing for a higher speed at touchdown!

When entering the program from the published listing, I encountered some difficulties, though. The first problem was the use of a variable called 'l' (lower case 'L'), which looked almost the same as the number 1. The second problem lay in figuring out the user-defined graphics which were printed as blanks throughout the listing.

In the algorithm of the program I found a bug in line 1290 which reads as follows;

```
1290 LET . . . :IF w<l OR w>24 THEN LET w=x
```

If the LM is in the leftmost position, it can be difficult to get it away from the border again. On the other hand, the rightmost position can never be reached. I have corrected this by putting in two 'IF' statements.

```
1290 LET . . .
1292 IF w<l THEN LET w=l
1294 IF w>24 THEN LET w=24
```

When playing the game repetitively, the waiting time for the screen to be built up appears rather long. It would be more satisfactory if the moonscape were not always redrawn. But this is only a minor drawback in an otherwise very exciting game.
Yours truly,
R. P. Loretan
Zurich

This is all it's supposed to do, and was intended to 'protect' your program. Not very practical I know, but some authors get quite neurotic about keeping their programs safe from being seen. Oh, and Thanks, and best wishes — Ed.

Tough BREAK

Dear *ZX Computing*
With reference to your letter entitled 'Helpful Hints' (Aug/September issue), the protection against the BREAK key on our Spectrum just crashes the program. The PAPER goes black, and cannot BREAK, so we have to pull the plug out, and that makes the 9VDC plug unreliable, which would cause the Spectrum to RAND USR 0, or NEW. I have gotten very angry about this.

I think your magazine is the best in the whole universe (for computers).
Yours sincerely,
Stephen Collings (9)
Farnborough

A Light byte

Dear Ray,
'Light Screen Designer' by Toni Baker is another great project in your magazine, and great things provoke big questions. So, here is one!

At DDD5, you find CDCCDC which means CALL DCCC and is a complete opcode. Accordingly, I read the following byte 01 as LD BC,dddd. So too does my Spectramon disassembler and corrupts the meaning of the following bytes. Yet Light Screen Designer works alright and prints message number 1. The same occurs in the RETURN TO BASIC part. Again, 12 should mean LD (DE), A, but the program knows better and prints message number 18.

Can can you explain how this works?

Here are two mistakes in the listing: DD89 in the DRAW CURSOR subroutine must read 1E36 and not 1E26, or you won't have a complete cursor. And, DE94 must be CDB6DD and not CBD6DD.
Sincerely yurs,
Louis Colombier
W. Germany

UDGs

Dear *ZX Computing*
I have often been puzzled by the way people set up their UDGs. The UDGs need to be set up within the program, or to be LOADed separately from tape. I have found a way to avoid these problems on both the 16K and 48K Spectrum, with or without interfaces attached.

It goes as follows:

1) Make the first line of the program a REM line, with number 1, and with enough characters after the REM to hold the data (eight for each UDG).

2) Make a variable point to the first character after the REM statement:

LET b=PEEK 23635+256 ✱ PEEK 23636+5

3) Make the first line uneditable: POKE b-3,0

4) Change the UDG pointer to b:

POKE 23675,b-256 ✱INT (b/256):POKE 23676,INT (b/256)

5) Use the shortest way to POKE the data into the REM statement:

FOR Y=USR "a" TO USR "a" + (8 ✱number of UDGs): READ a: POKE Y,a:NEXT a

(You could also use INPUT, of course)

6) Delete the FOR . . . NEXT loop for inputing/reding data. If you use this way of having the UDGs within the program, then of course the program itself must change the pointer to the UDGs before using them. You could easily have two sets of UDGs or more in a row. If you need the second or third set, then just poke the UDG pointer with the correct value before use.

In short, the advantages of this system are; no need for LOADing the UDGs separately, or having to wait until they are set up in the program; shorter listings, with less memory used; by POKEing 23675/23676, you have direct access to a large number of UDGs.

Even if you want to leave the UDGs at the end of memory, the shortest way to assign values is:

FOR Y=USR "a" to USR "a" + 8 ✱number of UDGs:READ (or INPUT) a:POKE Y,a:NEXT a

This makes listings like 'Cross The River' (August/September '84) use only one page, instead of almost three. The data should, of course be decimal instead of 'BIN', which spoils seven bytes each.

If one needs a blank line, there are three ways to do it:

1 PRINT " (32 spaces)"
2 DIM A$(32):PRINT A$ (for shorter blanks you can use **PRINT AT x,y;A$ (TO f)** for instance).
3 PRINT ,,

When only one line needs to be 'blanked', you see that the third way saves 32 bytes compared with the method in LINE 1.

In some progams I have found lines like: GOSUB 5005: RETURN. One should change this to GOTO 5005, because the RETURN there will cause the program to proceed from the first GOSUB anyway. This mistake occurs very frequently in 'The Golden Chalice' (issues August/September and October/November).

When I have my computer back from repairs (since I bought the Interface and Microdrive six months ago, It has been in repair constantly — I've been able to use it for no more than three weeks in that whole period), I might send you some programs of my own.

Yours truly,
Hugo Wapstra,
Noordebuurt 14
1271 xk Huizen (N-H)
Holland



Bugs

Dear *ZX Computing*
My children and I have enjoyed very much Toni Baker's programs (after debugging of course).

Unfortunately, I am afraid that programs come with bugs to make our lives more interesting. Let me point out some faults in the last part of 'Light Screen Designer'.

In the August/September issue:
1) At address 56632 in DOWN PIX, the coding should be FEBO as the instruction reads CPBO.
2) At address 56708 in DR_CURSOR. The address of DOWN PIX is DD36, so the coding should be 1E36.
3) At address 56713 in the same table, the address of UP PIX is DD29, so the coding should be 1E29.

In the October/November issue:
At address 56980 after CSR_EXIT in MAIN_LOOP the coding should be CDB6DD, as the instruction is Call DR_CURSOR, and the code for Call Addr. is CD and the address of DR_CURSOR is DDB6.

I am sure that most of the readers have managed to find these bugs, but I hope that my comments will be a help to some of them.

Finally, I would like to thank you for your wonderful magazine and the superb articles in it.
Yours faithfully,
Pinchas Levin
Israel

In with a vengeance

Dear Ray,
As a result of your courteous and helpful call last Sunday, we are back IN with a vengeance, much to the relief of my progeny with their Series 1, 2 and 3 Spectrums.

I have tried and tested

```
IF IN 65278-32 ×INT((65278/32)<31 THEN. . .
```

Which will enable all five keys in the row to be used.

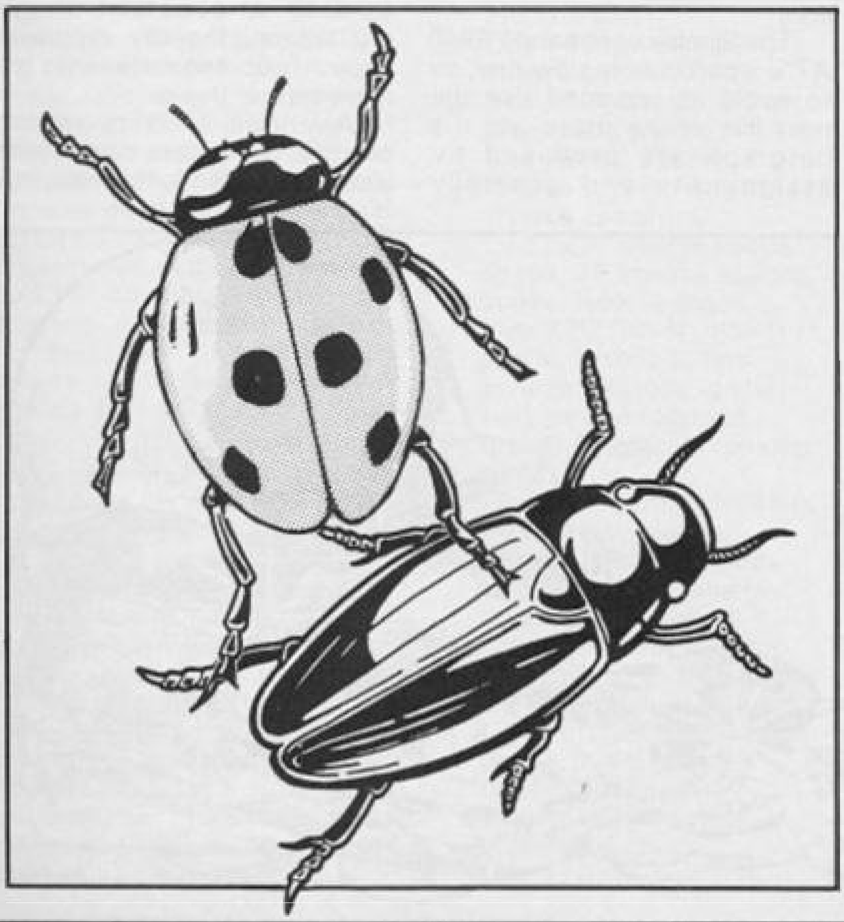
Changing the 65278 to the values for each row (p118 of manual) enables any row to be used. Chaging the sign to '=' the value to 31-1,2,4,8, or 16 enables any key to be selected for use. Excellent.

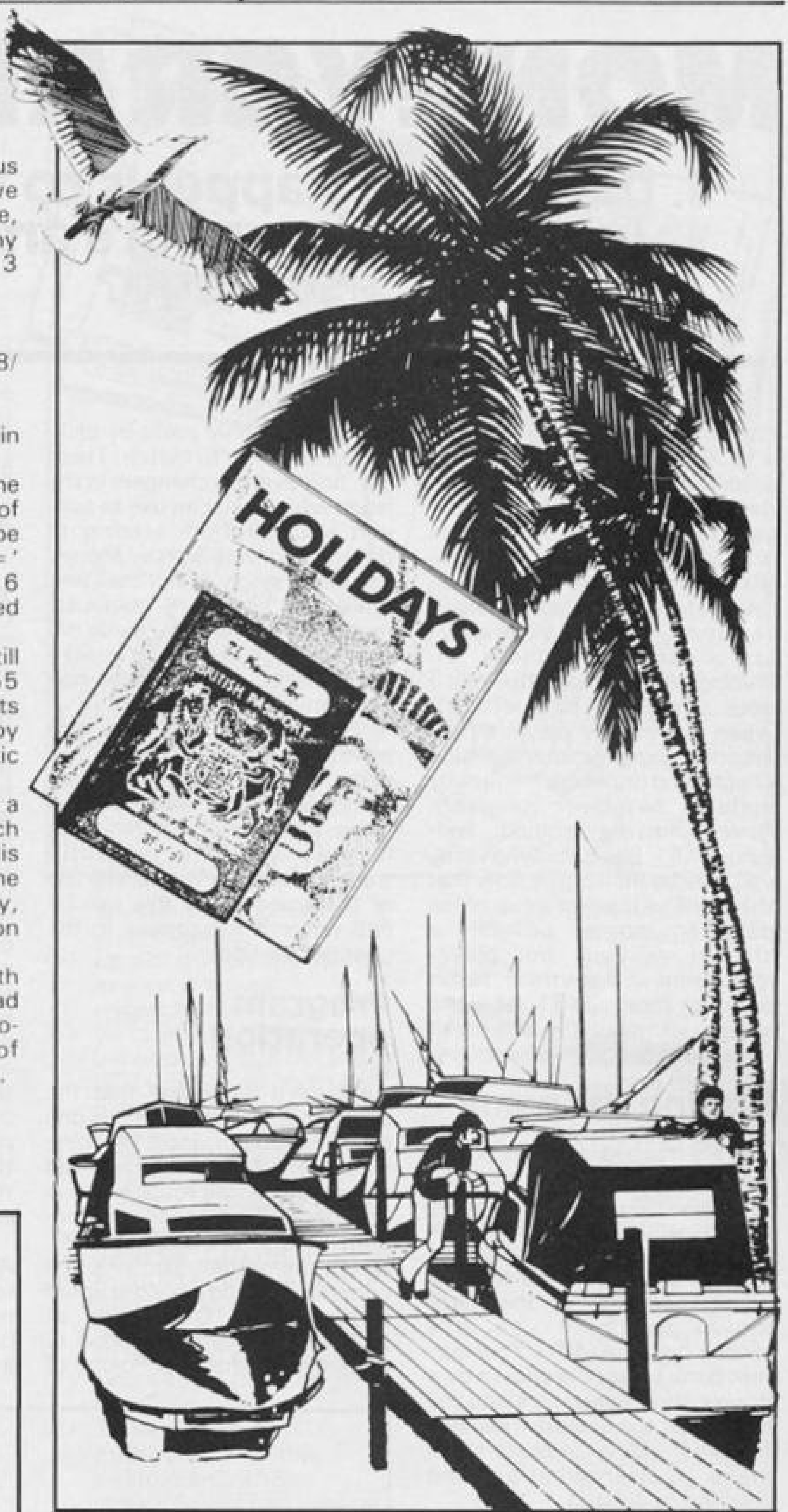
On test, my machine still wobbles between 191 and 255 when hot. I normally assist its cooling with natural draught by raising the base on four plastic screw-type bottle tops.

Finally, I lent my copy to a gentleman I meet at church each day to copy the QL program. His first attempt, it worked first time to the delight of all his family, but he had to slow the operation down.

I hope other readers with Series 3 machines have read that little aside on page 48. Doing so will remove lots of dissatisfaction and frustration.

Yours gratefully,
Jim Moran C.Eng.M.I.E.E.
Essex





Overseas market

Dear Sir
I have noticed that the advertisements in *ZX Computing* are aimed at the UK market and not the growing overseas market.

I have just received the August/September issue, so the A.G.F. offer had already expired. Also, most of us overseas have either Visa or Mastercard credit cards, and not Access or Eurocards.

I have bought items through your magazine i.e. Software Supermarket on their hot line, and received prompt service, but the majority of your advertisements do not offer Visa, Mastercard or hot line telephone numbers.

No doubt you are aware that your magazine is shipped world wide, and that you have a growing readership overseas. I find that your magazine is very informative and contains many useful bits of information, so come on you advertisers, is our brass no good? Remember, you get paid in advance with our credit card numbers.

Yours
Mr F. E. Southworth
W. Australia

MONEYGRABBER

J. Dave Rogers appeals to your basic instincts, Liverpool's answer to Scrooge?

Generating a random maze with a 'guaranteed' path through it is usually a slow job given present day Basic speed (one program I saw took two hours, and that was in Fast mode!). This program however, manages to continuously develop (as it scrolls) a random yet reasonably-structured-looking maze, including guaranteed paths, and it does this in the time left between moving the player's man around, doing various collision checks and printing a frequently updated two-layer Bargraph. Now, knowing languid, laid-back ZX81 Basic for what it is, you may be thinking by now that there will be time for a cup of tea between moves, possibly a shower as well, but player movement is, if anything, faster than in most ZX81 all-Basic written games. How is it done! — read the program description!

Playing the game

You are trapped in a maze which is slowly but inexorably creeping upwards. In it are scattered pounds and dollars which you must manage to grab enough of to keep your 'Bank Balance' in credit, because, as the maze moves overhead you lose money ('overheads'!). Your current bank balance is shown by a double-layer Bargraph along the bottom of the screen. This also features 'riding indicators' to make it clear what's being credited or debited.

After a few screenfuls of maze there is a 'chopper' section, and if you can negotiate this you receive a bonus. Having been given this bonus you are then liable to pay tax, so next comes Tax Dodgers Tunnel, where, if you are careful you need pay little, though, on the other hand, you could lose a lot!

The object of the game is simply to avoid bankruptcy and so survive to as high a level as possible. Of course, like anyone who thinks money is the most important thing in life, you will still lose in the end (a program with a moral!?). Your 'man' can be either a pound or a dollar sign and you can only profit by picking up currency to match. There are, however, Exchangers in the maze which you can use to convert yourself from sterling to dollars and vice versa. Money can occur singly or in 'runs', and while the latter are obviously much more profitable, if you are to reach high levels and avoid a fiscal fiasco *every* single one you can grab counts.

Each correct sign gives one point, each incorrect one deducts two points, as does blundering into walls of the maze. If you touch anything that is grey you are instantly transported back to near the top of the screen, and this can be bad news if it happens in the chopper section!

Program operation

Although I have said that the program is all Basic, there is one brief excursion into Machine Code in line 2010, but this is just a standard Scroll routine and is *only* necessary because the program Pokes to the display file, which the normal Sinclair scroll command would have disrupted rather badly. Old hands at ZX81-ing will also not need to be reminded that this Poking of the display file makes possible some nasty crashes if typing-in errors are made, so please Save-a-Few copies *before* you Run the program.

A sacrificial line?

The rather weird line 9999 is also associated with Poking to the screen. If the player ever tried to move off the top of the screen then addresses less than the start of the display file would be poked, and since these lie at the end of the program area (refer to Sinclair memory map), simply playing the game could overwrite parts of your carefully typed-in program! Extra lines could have been added in the main man-move loop to check agains this happening but would have slowed it down. So instead, characters in line 9999 are used as an unseen barrier line that can be Poked-at without doing any harm. Being numbered 9999 ensures that this line remains, by definition, the final item in the program area.

The Sinclair command PRINT AT is a particularly slow one, so to avoid its repeated use the next line of the maze and the bargraph are produced by assigning-to and generally juggling-with strings, which are all eventually concatenated into a single univeral string U$. Everything can now be put at the bottom of the screen using just one PRINT AT. Note also that U$ and M$ are dimensioned, so that no matter how much juggling is done with them they will automatically remain the correct length without needing any extra checks (Sinclair dimensioned strings remain fixed length once declared).

Some super-slicing

A useful saver of both time and typing (for computer and user respectively) is direct slicing, ie. rather than first assigning characters to a string variable and then slicing that, as is often done, the slicer is placed directly after the quotes. The program (or the person trying to decipher the program!) does not have to search for the string in a different area — it's right there in the line being executed. What is more, it is quite legal on the ZX81 (or the Spectrum) to directly cascade two slicers, or more if required, to operate on the same string, and as long as they are enclosed in separate brackets they will be executed one after the other. All you need to remember is that each successive slicer uses as it subject the resulting string of all previous slicers. For example, in line 730 the first slicer selects random-content/random-length substrings and a 'post slicer' then trims the overall length of this to a constant thirty characters, thereby replacing about four separate lines of more typical Basic.

Any of the 'Mid$' operations of other computers can also be easily simulated in this way, eg.



S$ = Mid$ (S$, 7,4)
becomes:
LET S$ = S$ (7 TO) (TO 4).
This is obviously *NOT* the same as:
S$ (7 TO 4)! It also works for assigning to strings e.g., Mid$ (A$, 12, 14) = B$
becomes:
LET A$ (12 TO)(TO 14) = B$

The Sinclair versions are, to my mind, logically clearer than the originals since the figures are 'just figures' in the latter whereas the Sinclair figures are annotated as to their actual purpose. Direct slicing is also used in line 440 to give the ZX81 near-equivalent an ON-GOSUB function, which is, of course, much faster than the six IF-THEN-GOSUB lines that it replaced. Other uses of direct slicing can be seen in lines 155, 175, 250, 540.

When slicing, any operations that yield non-integer results (e.g. Rnd) may as well be performed without the usual INT, because during slicing the computer will treat the numbers as integers anyway. The only difference to bear in mind is that the numbers will effectively be rounded up or down either side of point five whereas INT always round downwards.

Overall structure

The final shape of the mazes is determined by random choice but is tempered by a loose statistical influence in favour of more pleasing and interesting-looking outcomes. the actual algorithm used was evolved over quite a long period, and being somewhat baroque in style would take almost as long for me to describe in plain English! The number of possible different screens is over 65 thousand, because even though a typical screenful of maze uses 100 consecutive numbers from the ZX81's 65-thousand-long sequence of pseudo-random numbers, it could have started on any one of them, producing entirely different results.

From line 300 to line 995 the main program flows straight through, using only FOR-NEXT loops and frequent GOSUB calls to the man-move subroutine, thereby avoiding the dreaded 'tangled GOTO' style of non-structured programming. The actual positions of these GOSUB calls had to be carefully spaced out so that the execution time of lines between them was approximately equal (isochronal) otherwise man-movement would have been uneven.

Note that when a GOSUB 10 is executed, the program carries thrugh to the exit point at line 90 before returning, but in between there is a GOSUB 50, which means that this subroutine calls a part of itself i.e. it is recursive. In this particular case it provides two passes through the man-move routine for each single call to the maze-move routine.

Since the man-move routine is being called very frequently, it pays to keep it as short as possible, so I have included only one check within it, which looks at the man's next intended position and if it is not a clear space then, and only then, are more detailed checks made to actually see what the character is and what to do about it!

An array system is used for the INKEY$ check, and although somewhat wasteful of memory (320 bytes for the array 'M'), it is by far the best method in ZX81 Basic. It is much faster than separate checks for each key and it allows absolute freedom to designate several groups of keys all of which are usable at any time.



Typing in checklist

(1) All grey characters must be entered on key H, do not use the grey on key A.
(2) Line 20 is best entered in 'Fast' mode. The first quotes contain an equals sign and an inverse 'M', the second quotes contain sixty four g-shift-G, the third quotes contain sixty four g-shift-H.
(3) Line 145: inverse plus, inverse one.
Line 175: inverse G then fifty nine g-shift-G.
Line 250: 2 spaces, 2 inverse spaces, 4 spaces, inverse space.
Line 320: inverse space, space, 26 inverse spaces, space, inverse space.
Line 730:(seven g-shift-H, space, g-shift-E, two inverse fullstops, g-shift-7, two inverse fullstops, g-shift-R, space) repeated three times.
Line 865: inverse fullstop, two inverse spaces, inverse fullstop, twenty-two x g-shift-H, inverse fullstop, two inverse spaces, inverse full stop.
Line 880: g-shift-W, thirteen various, g-shift-Q.
Line 960: inverse space, space, inverse space, twenty-four g-shift-7, inverse space, space, inverse space.
Line 970: two inverse spaces, three spaces, inverse space.
(4) Do not dismiss line 9999 as a joke, it really is necessary! (see earlier).
(5) Be careful to differentiate between GOSUB 50 and GOTO 50, both occur a number of times in the listing.
(6) Line 2010 consists of: E, £, RND, FAST, SGN, g-shift-1, 5, space, g-shift-D, g-shift-1, inverse P, g-shift-2, GOSUB, inverse K, TAN. Note that the GOSUB can only be obtained by typing THEN GOSUB and erasing THEN.
(7) Line 440 — don't forget the slicer.
(8) To Save, type GOTO 9000 ENTER as this includes a CLEAR to reduce Save/Load time by erasing variables (particularly array 'M').

Line-by-line

10-45	Reduces bank-balance, prints updated Bargraph and next line of maze, moves maze up, keeps track of lines passed.
50-90	Man-move subroutine, called at approximately iso-chronal (equally-timed) intervals throughout the main program. NOTE that the INKEY$ check system allows the use of any selected group of keys.
100-196	Various collision checks: 110 — pick up money if man moves onto identical sign as itself. 125 — deduct money if wrong sign or wall of maze hit. 120 — replace man near top of screen if scrolled off or hits a grey area or a new-line (118) character. 180 — end the game if bank balance drops to zero.
200-280	subroutines associated with determining paths through main maze sections. These are called by a computed GOSUB in line 440.
300-640	Main maze construction loop, continuously

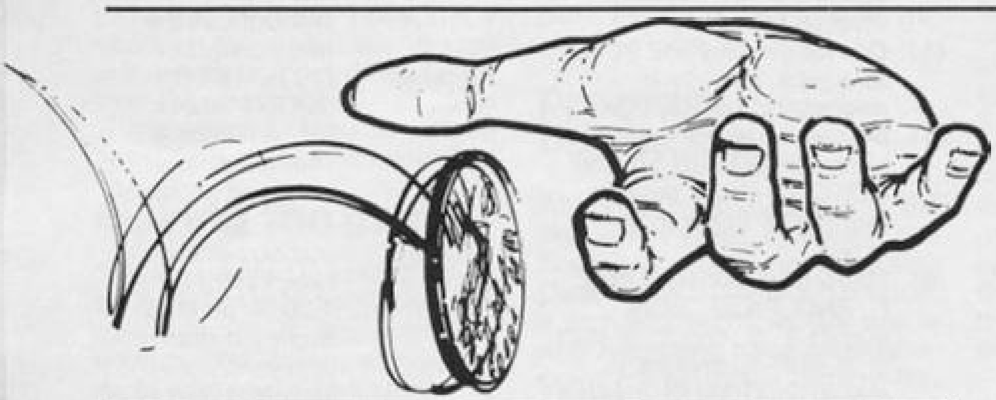
	designs a random, yet slightly structured maze, with 'guaranteed path' through any section.
650-770	Chopper bar sequence. A long string is randomly sliced and printed in different positions to give the effect of sequentially moving bars.
710	Ensures that increasing layers of choppers bars are printed as the maze moves up.
790	The split random number has the effect that very high or very low bonuses are still possible but are chosen less often than middle values (technically a Normal probability distribution curve).
900-995	Draws a 'gate' heralding each new level of the maze.
1000-2070	Initialise variables and print play instructions.
2010	The scroll routine (machine code) scrolls from line 21 upwards, leaving lines 22 and 23 stationary.
3000-3080	Adds a bit of life to introduction screen by running ripples down sides until player is ready and presses a key.
4000-4060	End-game display and option to play again.
7000-7080	Assigns values to elements of array 'M' that correspond to the codes of the keys to be used for man-movements. Any other keys, if pressed will just select elements that contain the default value of zero and so will have no effect. The 'plus ones' are added because Sinclair array subscripts start at one, not zero, and 'CODE INKEY$ will give zero when no keys are pressed.

Variables — general

BB	Bank Balance.
M(N)	INKEY$ control (array) of Man Movement.
U$	Universal string, used to print anything required for next line of maze.
X	Player's position.
CH	Character of man (£,$).
H	Hit character i.e. character at player's next intended screen position if it is not a clear space.
SOS	Start of screen (display file address).
LE/LNS	Level of game reached, lines reached.
I$	Riding-Indicators on Bar-graph. These travel back and forth on the end of the Bar-graph as it moves.
ADMAC	Address of Machine Code routine.

Variables — Maze construction

M$	Maze assembly string.
PA PB PC	Paths a, b and c, the 'guaranteed' clear paths through the mazes.
DE	Deviation of diagonal path (PC)
J	Horizontal 'joints' between maze sections
T LOOP	Number of maze sections before chopper sequence.
L LOOP	Number of lines in one section.
F,C,V	Used for chopper sequence.



```
  0▒REM MONEYGRABBER/JAN 84/BY:
J.DAVE.ROGERS(HOGROGPROG)/WALTON
LIVERPOOL 9.
   4 RUN 1000
   7 REM ------MAZEMOVE------->
  10 LET BB=BB-1
  15 IF BB<0 THEN GOTO 4000
  20 LET U$(31 TO )="=▒"+"▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"( TO
BB)+"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
▒▒▒▒"
  25 GOSUB 50
  30 LET X=X-33
  35 PRINT AT 21,1+USR ADMAC;U$
  40 IF X<SOS THEN GOTO 100
  45 LET LNS=LNS+1
  49 REM ----PLAYER-MOVE------>
  50 POKE X,0
  60 LET X=X+M(CODE INKEY$+1)
  70 IF PEEK X THEN GOTO 100
  80 POKE X,CH
  90 RETURN
 100 REM ------HITCHECKS------>
 105 LET H=PEEK X
 110 IF H=CH THEN GOTO 140
 115 IF H=CODE "E" THEN GOTO 190
 120 IF X<SOS OR H=20 OR (H>135
AND H<140) OR H=118 THEN LET X=S
OS+37+RND*24
 125 LET BB=BB-2
 130 LET I$="(-2"
 135 GOTO 150
 140 LET BB=BB+1
 145 LET I$="▒▒"
 150 FOR H=1 TO 9
 155 POKE X,CODE ".*X.*.X*."(H)
 160 NEXT H
 165 IF BB>59 THEN LET I$="FUL

 170 LET BB=BB-(BB>59)
 175 PRINT AT 22,0;"▒▒▒▒▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"( TO ABS BB)+I$
 180 IF BB<1 THEN GOTO 4000
 185 GOTO 50
 190 LET CH=12+(CH=12)
 195 POKE X,CH+128
 196 RAND
 200 REM -----PATH-BENDING---->
 210 RETURN
 220 LET PA=1+RND*PA
 230 LET M$(PA TO PB)=""
 240 RETURN
 250 LET M$(J-L TO J+L+1)=
"    ███    █"(L+L TO )
 260 RETURN
 270 LET M$(PA/2 TO PB-1)="█████
████████████████████████"
 280 RETURN
 300 REM ------MAIN-MAZE------>
 310 FOR T=1 TO 5
 320 LET M$="█ ██████████████████
██████████ █"
 330 IF T=1 OR T=4 THEN LET M$=
M$(6+T TO )+M$
 340 GOSUB 50
 350 LET PA=4+RND*14
 360 LET PB=PA+RND*8
 370 LET PC=4+RND*25
 380 GOSUB 50
```

```
400 FOR L=1 TO INT (RND*7)+6
420 LET M$(RND*17+2 TO )( TO 9)
="▒▒▒▒▒▒▒▒▒"
430 GOSUB 50
440 GOSUB 200+10*VAL "557270000
00000"(L)
450 GOSUB 50
460 LET M$(PA)=" "
470 LET M$(PB)=" "
480 LET DE=RND*4
490 GOSUB 50
500 LET PC=PC+DE
510 IF PC>25 THEN LET PC=PA
520 LET M$(PC TO PC+DE)=""
530 GOSUB 50
540 LET M$(3+RND*25) ="£££$$$EE
█ "(RND*9+0.5)
550 LET U$=M$
560 GOSUB 50
570 GOSUB 10
580 NEXT L
590 LET U$(2 TO 29)=""
595 LET U$(J-1)="█"
600 GOSUB 50
610 LET J=INT (RND*19)+7
620 LET U$(J TO J+1)="██"
630 GOSUB 10
640 NEXT T
650 REM ----CHOPPER-BARS----->
660 LET U$=""
670 FOR F=0 TO 25
680 GOSUB 15
690 IF F>14 OR F<6 THEN GOTO
    770
700 FOR C=1 TO 6
710 LET V=34-C-C-F
720 GOSUB 50
730 IF V<22 THEN PRINT AT V,1;"
▒▒▒▒▒▒ ██████ ▒▒▒▒▒▒ ██████
▒▒▒▒▒▒ ██████ "(1+RND*16 TO )(
TO 30)
740 IF PEEK X<>CH THEN GOSUB 99
750 GOSUB 50
760 NEXT C
770 NEXT F
780 REM ---------BONUS---------
790 FOR N=1 TO INT (RND*12+RND*
12)
800 PRINT AT 9+N/3,2;"/ BONUS £
;N
810 LET BB=BB+1
820 LET I$="BONUS"
830 GOSUB 165
840 NEXT N
850 REM -------TUNNEL-------->
855 FOR L=1 TO 29
860 GOSUB 50
865 LET U$="▀▀▀▀▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▀▀▀"
870 PRINT AT 23,7;" TAX DODGERS
 TUNNEL "
875 GOSUB 50
880 LET U$(3+RND*11 TO )( TO 15
)="▙ O O O O ▟"
885 GOSUB 20
890 NEXT L
895 LET U$=""
897 GOSUB 15
898 IF L<37 THEN GOTO 890
900 REM ----GATE/NEW-LEVEL--->
910 LET LE=LE+1
920 LET LNS=0
930 FOR G=1 TO 1+(LE>1)
940 FOR L=16 TO 13 STEP -1
950 GOSUB 50
960 LET U$="█ █▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀
▄▄▄▄▄▄▄▄█ █"
970 LET U$(L TO L+5)="██   █"
980 GOSUB 15
990 NEXT L
991 PRINT AT 19,6;">LEVEL>";TAB
24;LE
992 LET U$(2 TO 29)=""
993 GOSUB 15
994 NEXT G
995 GOTO 300
1000 REM -----SET-UP/START---->
1010 CLS
1020 PRINT "MONEYGRABBER"
1030 LET X=VAL "0"
1040 LET CH=CODE "£"
1050 DIM M$(30)
1060 LET BB=54
1070 DIM U$(95)
1080 GOSUB 7000
1090 LET SOS=VAL "PEEK 16396+256
*PEEK 16397"
2000 LET ADMAC=VAL "5+PEEK 16425
+256*PEEK 16426"
2010 REM E£RND FAST SGN ▀5 ▒▀▀▀
GOSUB █TAN
2020 LET LE=X
2030 LET LNS=X
2040 POKE 16510,X
2050 POKE 16418,X
2060 LET X=VAL "SOS+546"
2070 PRINT AT 1,2;"MOVEMENT KEYS
:C(OR V)--RIGHT",,"Z(OR X)--LEFT
",,"N(OR M)--DOWN",,"J(OR K)--UP
";AT 8,2;"COLLECT MONEY OF TYPE
MAN IS.   (USE THE ""E""S TO CHA
NGE TYPE)"
2080 PRINT AT 11,3;"HITTING ANYT
HING ELSE LOSES     MONEY. ALSO
BEWARE OF GREY";AT 16,2;"U.R.HER
E ---->"
2090 GOSUB 10
3000 LET J=0
3010 FOR L=0 TO 21
3020 PRINT AT L,0;"▒";TAB 31;"▒
";AT L,0;"=";TAB 31;"="
3030 IF INKEY$="" OR J=0 THEN NE
XT L
3040 PRINT AT 5,3;"* KEYS 5 TO 8
 ALSO USABLE *";AT 13,6;"▌▌ ANY
KEY TO START ▐▐";AT 23,22;"<:CAP
ITAL"
3050 IF L<21 THEN GOTO 900
3060 LET J=7
3070 RAND
3080 GOTO 3010
4000 REM ------GAME-OVER------>
4010 DIM U$(224)
4020 POKE X,CH+128
4030 PRINT AT 0,0;U$;AT 0,0;"NO
MONEY LEFT, YOU"+(" ONLY" AND LE
<4)+" REACHED LEVEL ";LE;" PLUS
";LNS;" LINES"
4040 PRINT AT 3+RND*2,1+RND;"--P
RESS ""P"" TO PLAY AGAIN--->  "
4050 IF INKEY$="P" THEN RUN
4060 GOTO 4040
4070 RAND 10418
7000 REM ---DEFN-MOVE-KEYS---->
7010 DIM M(64)
7020 REM EACH GROUP OF 4 KEYS IN
I$ ARE:LEFT/DOWN/UP/RIGHT
7030 LET I$="CZNJ,8567,VXMK"
7040 FOR L=1 TO LEN I$
7050 LET H=L-5*INT (L/5)
7060 LET M(1+CODE I$(L))=(H=1)-(
H=2)+(33 AND H=3)-(33 AND H=4)
7070 NEXT L
7080 RETURN
9990 REM ----AUTOSAVE---->
9996 CLEAR
9997 SAVE "M█" J.DAVE.ROGERS 84
9998 IF INKEY$="" THEN RUN
9999 REM SEE TEXT>==============
=================
```

Readers' Reviews



Once more we open our pages to the people who use the programs the most — YOURSELVES!

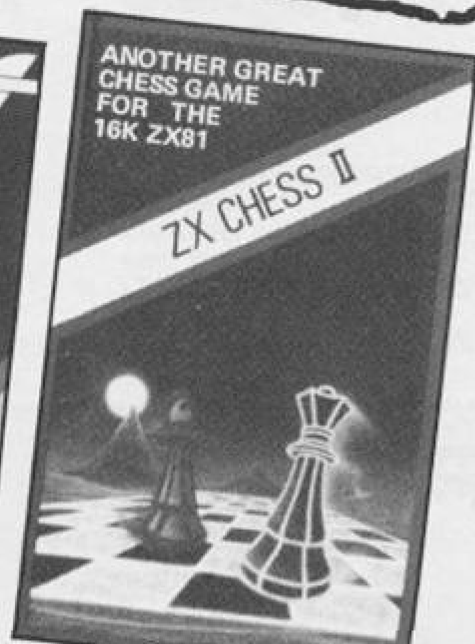
Advanced Tactical Reconnaissance And Attack Mission
Atram
Don Thomasson

From the beginnings at the level of Ludo and Halma, board games have developed to a point where complex calculations on paper are needed to keep track of all the variables. Monopoly avoided this by using play-money and little wooden blocks representing houses and hotels, but a game like 1829, dealing with railway construction, needed something more flexible. It is not surprising that a small computer was used to provide a solution. The program was home-brewed for an obsolescent machine, so it could not be made generally available, but it was inevitable that computer/board games would eventually emerge as a variant of the existing range of formats.

The first example to appear is not ideal. That it is a battle simulation is not, perhaps, in sympathy with current thinking, but there are more important problems. Each player has twenty aircraft, two aircraft carriers, six missile batteries, a refuelling tanker and three airfields. Working out which piece is which is to some extent a matter of deduction, some being obvious, others not. The pieces are held in place magnetically, which is a nice feature. The game is for two players, though two others can participate as computer operators. Each player takes half of the playing board and sets up his forces, unable to see what the other player is doing. the two boards are then joined (magnetically), and a coin is tossed to determine which player starts! (Couldn't the computer do this?) The player in action makes his moves, which are reported to the computer, and the consequences appear on the screen. The other player works the computer, and like a snooker player, waits his turn. This may go on for perhaps half an hour! Then the roles change, and the attack swings in the opposite direction. It might have been better to alternate play more frequently.

In terms of manufacture and general presentation, the game almost wins full marks, but slight changes to the rules and a clearer definition of the pieces would make it much better.





Artic Chess II
Artic Computing
John Cooper

The program comes neatly packaged in a cassette box with instructions on how to use the tape on the inlay card. There are two copies of ARTIC CHESS II on the tape — one on each side. The instructions are clear and to the point, so I had no problems using the program.

Once loaded you are prompted to input P, A or L for PLAY, ANALYSE or LOAD. I decided to PLAY and was then offered a choice of colours (black or white) and a choice of levels to play on (0-6).

Having decided to play white on level one, I was presented with a large chessboard with the pieces set up in the starting position. I entered 'E2 E4' and to my delight the pawn at E2 was moved up to 'E4'. The program is in full machine code, so I did not have to wait long for a reply (on this level it took one second).

It is a good idea to have a chess set and board handy to start with until you get used to the screen display. On all levels except '0' the computer will recommend a move for you if you press "M" except in the very early stages of a game. Other options are as follows:

(1) 'T' saves the game on to tape (so it can be continued at a later date).
(2) 'Z' copies the position onto a printer.
(3) 'S' pressed at any time during the game will return you to the PLAY ANALYSE or LOAD prompt. This can be usefully used for resigning and going into ANALYSE mode in which you can place and delete pieces as you want. I have one major quibble here, playing on from the set-up position. You have to press 'Z', and then you have to enter a move depending on whether you are black or white before going into ANALYSE mode, only then does it ask you what colour you want to resume play as, and at what level you wish to play.

Overall, this is a superb chess game for the ZX81 with 16K RAM which plays a strong game with varied openings and I would strongly recommend it to anyone who wants a good game of chess.

ARTIC CHESS II is available from: Artic Computing, for £9.95.

SPECTEXT: The Spectrum Word Processor
McGraw-Hill
Carol Brooksbank

The impressive box in which this tape arrives claims that "SPECTEXT includes all the features you would expect in a professional word processor". This, I am afraid, is far from true.

The word processor program is very disappointing. Although word wrap is included, the text is not justified, so the final appearance is no better than anything you could produce on a typewriter. There are no facilities for embedding printer controls other than 'newline'

and 'new paragraph' in the text — so no underlining, no changing to italic or bold type is possible — and the only way of tabulating is to enter spaces. In addition, the CAPS LOCK key is disabled, and the only way that I could discover of engaging it is to break out of the program, engage CAPS LOCK, enter "GO TO 1" to get yourself back to the menu, and select the 'enter text' option to carry on. You then repeat the whole laborious process to get back to lower case.

The editing facilities are good enough, easy to use, allowing you to delete, alter, move blocks of text around, and search for particular words or phrases. Text can be saved on tape or Microdrive, and loaded into the program. The page formatting for the printer is good. You can choose margin width, number of characters per line, single or double line spacing, number or un-numbered pages, and the number of lines you wish to leave blank between pages. You can also elect to pause the printer at the end of each page when using single sheets, to allow you to insert paper.

The instructions are clear and detailed, but you have to print them for yourself, using the program. The leaflet which comes with the tape explains how to do this, and there are no problems other than the length of the text. If your printer has a condensed type option I recommend using it for this!

In addition to the word processor, the tape includes a filing program. This offers up to 15 fields per entry, with a field length choice of either 23 or 55 characters. The file can be sorted alphabetically by any field, and sorted again by other fields if required. This allows you to sort a list of names, for instance, first by surname, and then within each surname by Christian name. The file can be searched by any letter, word or phrase, and the whole file can be viewed by searching for a space. The file can be saved on tape or Microdrive. The only problem I found with the file program is that the facility to produce a hard copy of one entry is limited to the ZX printer. It seems unlikely that anyone with only a ZX printer would want a program like, this, and it is a drawback to anyone with a full size printer.

The third program is a merging program, enabling you to produce those personalized letters such as you get from book clubs, telling you how lucky you are. This program seems to me to be the most successful part of the suite.

The software drives a ZX printer, or a Silver-Reed EX 44 typewriter used as a printer with IF44 interface. It can also drive Kempston or Hilderbay interfaces, or Sinclair Interface 1, and there is a program on the tape to generate machine code to customize it to suit whichever of these you have, and to suit your printer. For my Kempston/Epson setup, I had to make only one alteration, to alter the code for the '£' sign.

To sum up, I would describe this as a filing and merging program with text editing facilities. It is certainly not the program for anyone wanting a serious professional word processor, and it is very overpriced for anyone wanting less.

Masterfile
Campbell Systems
S. Datoo

As far as business software for the ZX Spectrum is concerned, there are several database programs available on the market. Campbell Systems advertisement for their program "MASTERFILE" asks "Can Your Database Handle This? MASTERFILE can!". Having used both version 8 and version 9 of this program I can guarantee that their claim is no idle boast! The latest version gives one the option of formatting the data to be displayed on the screen as well as being printed onto a full sized printer, but more about that later.

The program loads in two parts, the first one being a BASIC program which one may manipulate to suit individual requirements provided that the default line numbers and relevant statements are not altered. The second part is fully machine coded, but even here the user can adapt the program to suit his or her taste. For example, the program as supplied will allow the user to format 26 data references for each record, but for those requiring more than this number, the manual which accompanies the tape instructs you on the method to increase the number to 43. However, with a little experimenting I discovered that this number can be further increased to 58! To verify that what I was doing to increase the number of data references was corect I telephoned John Campbell, the author of the program. I was completely bowled over by the helpfulness of Mr. Campbell, and in my experience there are not that many companies that could match his after sales customer service.

Like all other database programs, "MASTERFILE" Also has a demonstration program which illustrates the versatility of the program. One is able to see the various layouts which can be designed for each file, and this is extremely useful for setting up formats that are sorted by different fields. For example, the demonstration program is a file of employees and the information held in each record gives the department that the individual works in, the salary, job title, home address, and other additional information in note form. The layouts which have been designed will sort and display the information by name, by department, or by salary, and most usefully in an address label format. The user can switch from one format to another quite literally at the touch of a button.

The menu

At each stage of the program there is a very helpful "menu" or "mini-menu" displayed which makes it very easy to use the program. The keyword throughout the program is "user-friendliness". The main menu offers the following options:

ADDING A NEW RECORD
The number of records held in the file is displayed on line 23. The amount of space available (in bytes) is also constantly displayed on the same line.

LISTING ALL THE REPORT REFERENCES
This shows the reference of the various layouts that have been created.

DISPLAYING OR PRINTING THE FILE
The display option is also available via other "mini-menus".

EDIT OR FORMAT A REPORT
This is used to either review or amend a display format.

LOADING A FILE OR SAVING A FILE
The program is fully Microdrive compatible

SEACHING THE FILE FOR SELECTED RECORDS

INVERTING THE SELECT STATUS OF EVERY RECORD

RESETTING THE SELECT STATUS OF EVERY RECORD
The above three options are used together when searching for a particular record or a group of records.

ERASING ALL THE RECORDS
As with all erasures there is a fail-safe built into the program which asks the user to confirm before execution.

EXECUTING USER BASIC
This option is especially useful if one requires arithmetical functions to be carried out on numerical data held within the records. For example if one wished to express an item as a percentage of another then this is quite easily done by writing a short and fairly simple BASIC routine within the specified lines.

When adding a record one may select the auto prompt option which does away with having to remember the various data references that have been named for each record. Each data item can be upto 128 characters long. When the data is displayed, "MASTERFILE" performs rudimentary word processing such that all leading blanks are ignored, a clean left margin is maintained, and word-breaks are minimised. Numeric data is right justified. The vertical line character (i.e.':' found under the S key on the SPECTRUM) has a special use in "MASTERFILE". It forces a line break so that text may be keyed in as a single line but with the vertical line characters (VLC) as line separators, so that when the data is displayed in a 4-line-deep paragraph, for example, each VLC forces a line change. This is very useful for address labels.

The amount of memory that is available for storage of data per file is approximately 32K but this is reduced slightly if the full sized printer option is used. I use "MASTERFILE" with a full sized printer almost on a daily basis at work and I have found the memory available to be quite ample.

I stated earlier that the user could design various formats for displaying the records on screen. In addition to this the user has a choice of having the normal 32 characters per line or opting for 42 or 51 characters per line. As far as the print option is concerned, if one wished to print the file to a full sized printer then this is achieved with the aid of an additional program entitled ▶

"MF PRINT" which is available separately from CAMPBELL SYSTEMS. "MF PRINT" will enable the user to print upto 200 columns per line. Here again, one may design the layout according to requirement. When printing to a full sized printer it is possible to have all numeric data edited so that leading symbols (e.g. £ or $) will be automatically printed. In addition, columns of figures can be totalled and thousands' commas inserted automatically.

I have been using "MASTERFILE" for just over 1 year now and at present I am using it at work almost every day. If anyone is considering buying a database program then I would say this to them; I have used three database programs on the SPECTRUM and none of them can beat "MASTERFILE".

"MASTERFILE" is priced £15 and "MF PRINT" is priced £6.95. If the two are purchased together then the cost is reduced to £19.95. The programs are available from CAMPBELL SYSTEMS, 57 TRAPS HILL, LOUGHTON, ESSEX IG10 1TD.

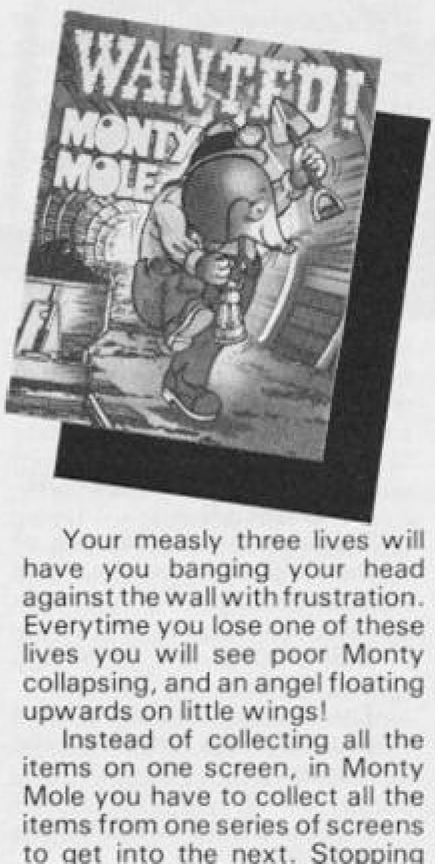
Monty Mole
Gremlin Graphics
Mark Tynan

The idea behind Monty Mole can hardly be described as original, but this does not mean the game lacks in addictiveness! The game is based around the character Monty Mole, who, having to face a long and cold winter, must venture deep down into his local coal mine in search of coal to keep him going for the winter.

But as always, this is not as easy as it sounds! While he is in the deep dark recesses of the mine, in order to collect the pieces of coal scattered all over, he must dodge robots that move in regular patterns (similar in style to Jet Set Willy and Manic Miner), and he must also watch out for the Crushers, which can squash him. These Crushers move up and down with random pauses in-between, so getting past them is more a matter of guess work and luck rather than skill and timing. And, if that is not all, bricks and other objects fall through open shafts above Monty when he is in the mine, and of course, there is the old hazzard, familiar to all you Miner Willy fans — falling from great heights. Not forgetting the dreaded moving platforms that can disappear from under your feet. Sound difficult? Well it is!

In my opinion the game is a cross between Jet Set Willy, Manic Miner, Fred, and The Alchemist. The fact that Monty has to climb ropes in order to travel to the different screens, must have been infuenced by Fred. The screens are very much like those of Miner Willy games and The Alchemist.

All the above action is created in excellent smooth cartoon quality graphics. When the game has loaded, the computer presents you with a menu asking you if you want to use keyboard/Kempstone/Sinclair joystick. On the first screen of the game, you have to jump across a broken bridge and then avoid acorns dropped on you from a less than friendly squirrel sitting in a nearby tree. Having survived all this, you have to steal a coal bucket left outside a house. After stealing the bucket, an angry miner will come running out after you, while you have to dodge the acorns and jump across the bridge again! From then on, we say goodbye to the angry coalminer and head off to the actual mine where all the action takes place.



Your measly three lives will have you banging your head against the wall with frustration. Everytime you lose one of these lives you will see poor Monty collapsing, and an angel floating upwards on little wings!

Instead of collecting all the items on one screen, in Monty Mole you have to collect all the items from one series of screens to get into the next. Stopping you from getting onto the next series of screens is a brick wall that will magically disappear when you have collected all the items!

There is not much sound during the game — just as well too, the game is annoying enough! One criticism of the game being that there are other items which you can collect and in turn these enable you to kill some robots, but allow you to get killed by collecting other items. Not much information is given about these items, but this does not subtract much from the enjoyment of the game. Another criticism is that the game is slightly too hard, making it a bit annoying to play.

It is a game that requires practise to become good at, and I believe that it has the edge over Jet Set Willy, but will not rank as high in the charts mainly because, at the time Jet Set Willy was released, the standard of games then was lower than it is now, so Monty Mole has a harder struggle to the top. The game supports both Kempstone and Sinclair Joysticks. All in all, I think Gremlin Graphics have a winner on their hands!

Show Jump
IMS Software
Nigel Stutt

Here we have, not a super-exciting space battle, silly platform game, nor an adventure, but a nice, well presented Show Jumping game for the horse enthusiast (or even for the not so enthusiastic horse hater). To be honest, I don't really like horses or show-jumping, but this game is, I think, very good and worth a review.

The cassette artwork is not amazing, and I think this is why the game is not too common in the shops. There is nothing wrong with the game itself, and the rules are rather straightforward — you have to complete the course with the least number of faults and the best possible time. If two players gain the same number of faults, then the times determine who goes onto the table.

First though, some notes about the table, and then I'll go onto the game itself. The table is drawn up for each course, and the best qualifier (with the least faults and/or best time) is placed onto the table for that course. There are eight different courses, some of which require very careful riding, whilst others are purely fast courses, relying on time rather than the number of faults. The qualifying time for each course is used for the next competitor to provide a time check at each fence and give an idea whether they have a faster or slower time than the last competitor.

At first sight, the course looks a little confusing although things soon become clear. Shown at the top of the screen are your times and faults, with a representation of you on your horse. The main part of the display is taken up with a plan of the course. The start line is shown in blue and white, and the jumps in black.

You and your horse are shown as a line with ears (supposedly a bird's-eye view). This is one of the small faults in the game, and I'm sure that the game's writer could have come up with a better graphic likeness than this.

Play is controlled by five keys, for Left, Right, Faster, Slower, and Jump. These are quire straight forward and respond quickly (they need to with my jumping). Once you press Faster, the horse at the top of the screen will start to 'walk'. This is very realistic and you should be impressed, but just wait 'till it gallops and jumps! You will also see that your horse has started to move forwards on the course, and that a section of the starting line has begun to flash. Once you have crossed this line the time counter begins, and the first jump will start to flash if you jump any other fence, then something nasty happens to your horse.

You gain three faults for a refusal, and four faults for hitting a fence. It is best to jump forwards over the lower section (right in the middle) of the fence, though it is possible to jump across at an angle (but not recommended as this can cost you quite a few faults).

By now, I bet you're wondering — 'How do you jump?'. Well, this involves the graphics of your horse at the top of the screen. Once you get up to a gallop and head for a fence, you should see the fence approach your horse, at which point you must try to time your jump correctly. One other problem I found in the game is that the horse refuses too often, sometimes when it is only five feet from the fence (though I suppose this is like real life).

So, you must continue jumping until you reach the finish line and this, I can tell you, is no easy task. Avoiding wrong jumps and staying within the boundaries at the same time as trying to swing into the right position for the next jump is almost impossible at high speed, and so the overall effect is very realistic indeed.

The numerous courses mean that the game is always interesting to play, and I'm sure that many horse lovers will find this the perfect game, although I tend to think that it may be a little slow for those who like fast aracade games. Still, a good game.

Show Jump is produced for the 48K Spectrum and available for around £5.50. ■

CHILD'S PLAY

We look at a special computer for the youngest members of the family



Frequently, a computer is introduced to the home by the children "persuading" their parents that it will help them with their education or future employment prospects. Just as frequently, the father does not need that much persuading and Mum eventually comes round to the invasion of yet another set of wires and leads into the home. Dad then begins to take an interest in computing himself, and experiments with programs, eventually buying himself a machine so that junior(s) will leave him alone and play the latest state-of-the-art arcade wonder elsewhere. Many Mums now secretly begin to try their hand on the little box, although usually when the bread is being won.

In many families there is still one person left out, and that person, from my own experience, can be volubly insistent that he/she gets a go on the 'puter. I am of course referring to the most junior member of the family, the child of 3-5.

The sophisticated high speed arcade games are unsuitable for such a child and, although there are some programs aimed at this age range, the younger child finds the multi-legend, upper case keyboard confusing. The more capable parent may produce a program to allow some usage — I wrote a very simple one which allowed my child to type in letters and she quite happily sat there writing her name — but in most cases the time between the initial request and having the program ready will be too long and the child's interest will pass onto pastures new.

But now . . .

A computer which hit the market recently is, **MY TALKING COMPUTER** from MICRO-SPEECH LTD. This is a sturdy unit which uses a touchpad for input and a voice synthesizer for output. The whole thing has been very carefully designed and has a definite educational value as well as being fascinating for the child. The basic unit is £59.95, batteries or mains adaptor cost extra, and it has 21 programs which deal with reading and maths skills over a wide age range.

The spoken output is the best I've yet heard — a distinct female voice which is clear, understandable and friendly. There are sufficient inflexions to make it far more human than any others I've heard. This gives instructions, prompts, encouragement and corrections.

The touch sensitive keypad works in conjunction with a booklet of brightly coloured overlays which are laminated so that sticky finger marks can be washed off. These are used to select the program and RUN it ("Now press GO"). Also included is a plastic clock face with fully moveable hour and minute hands. All this is very solid and robust and will take a lot of hard wear.

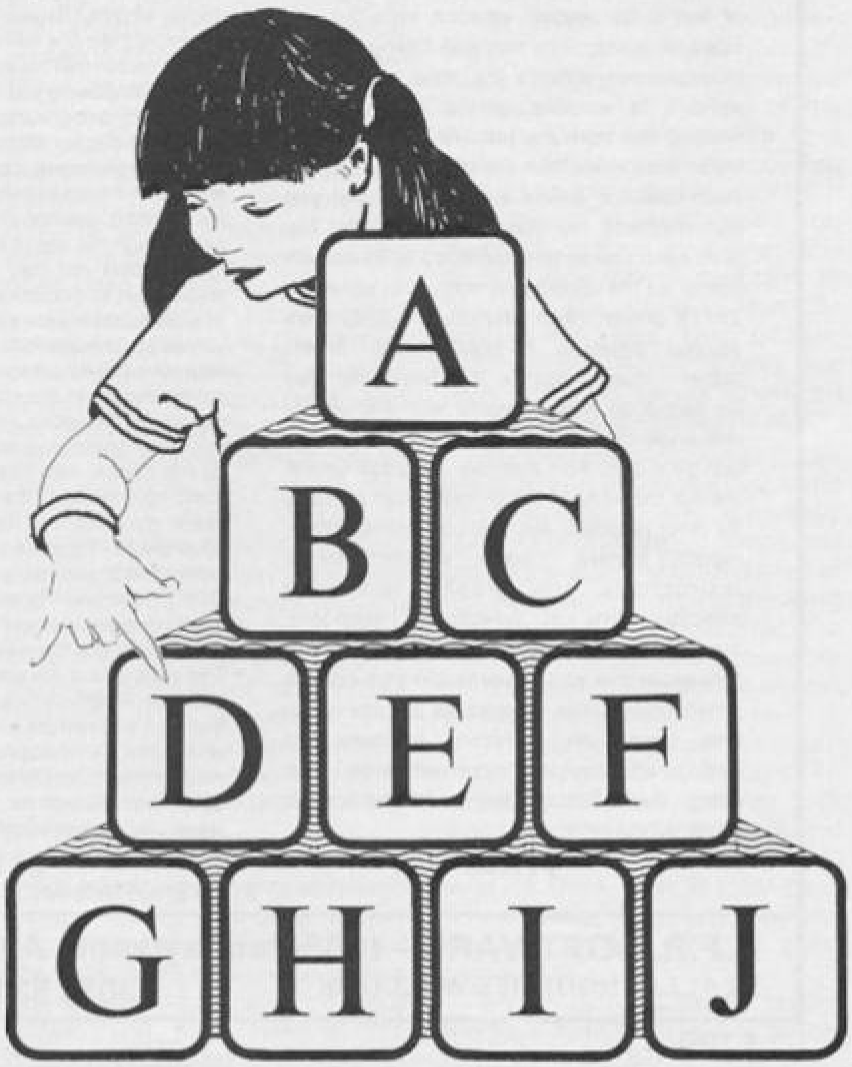
Part of the impressive detail and thought which have gone into this product are the simple but essential "extras" such as the automatic 'off' switch, which activates if the computer has not been touched for a minute, so saving on batteries and the parents' time in forever checking that it has not been left on.

There are similar units, but these tend to suffer from being limited in their functions. My Talking Computer is expandable, and the first (of many, I hope!) module for it is now available. This provides another 120K of programs, five main programs divided into 17 'sub' programs, each with its own overlay, again in laminated booklet form. The module covers the topics such as Music, using colour coding, Sentence making, which provides a twenty word speech processor, Digital time, Talking alphabet, and Talking Colours and Shapes.

All in all, a wide variety of essential skills for young children, are presented in a fascinating and effective way. I can vouch for it from watching my own children and wife using it! (Oh all right, so I had a few goes as well).

The expansion module costs £17.95 and these units are obtainable at most larger stores.

If you have a child, then this "toy" will ensure many hours of peace for the older members of the family and the child cannot fail to benefit educationally. Unreservedly recommended! Interestingly, many schools are now equipping their BBC's with Concept keyboards and speech units — £600 to do what this machine does for £60.



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Legend of the Century

Century Software, part of Century Communications which in turn is a division of Century Publishing Co., have released the most impressive looking package for the 48K Spectrum that I have seen so far! In a large library case type plastic box comes Legend, the game and the book. The cost for the complete set is £14.95 and of that the book has a price of £2.95. A colourful map and a leaflet of instructions are also supplied.

The novel, so Century assure me, is in its fourth printing so it seems unfair that you have to buy the book again if you've already got it, just to get the game.

I was able to sit down one night to read this tome and I must admit that I enjoyed it, it's a "sword and sorcery" novel with overtones of the Alamo and King Arthur, but very well written with good characters and a compulsive plot. It is however, full of blood and guts and may not be everyone's idea of wholesome reading! The game is actually two programs, and viewed in this light it seems less expensive. The first part is an interesting mix of multiple choice adventure and the classic problem solving adventure. Also within this section is a graphic combat sequence (all opponents look strangely similar) which needs fast reactions and skill to surive, and an arcade sequence which is reasonable.

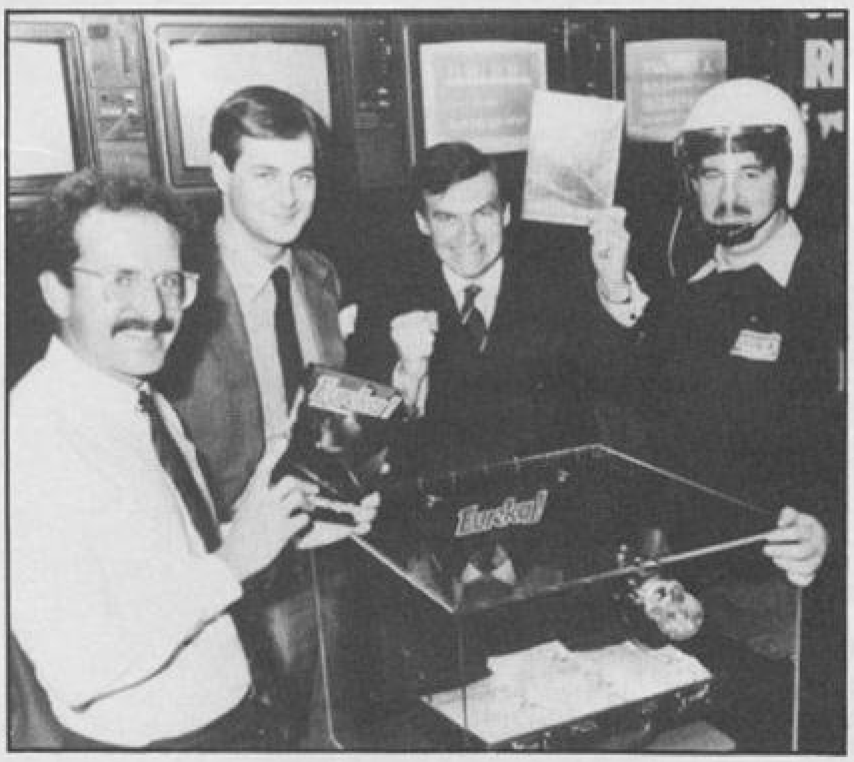
The text is quite verbose, and I found it sucessfully recreated the atmosphere of the book, although the action does not necessarily follow the original plot. Some of the problems were rather irritating. The second section, which can be played independently, is a strategic simulation and it's not easy at all! I liked it and wish I had more time to discover the subtleties of playing this game.

Eureka = £25,000

From Domark comes Eureka, five games in one package, each consisting of a simple, but not so easy, arcade style game followed by a full blooded adventure game. The graphics in the adventure game are very good indeed, and it is very difficult. Well, it would have to be with £25,000 at stake wouldn't it?

The five sections represent five historical time periods; Prehistoric, Roman, Celtic, Wartime Germany and Modern Carribean and you have to collect a piece of a talisman from each. The accompanying booklet is beautifully illustrated and, all in all, at first impression, this is a well produced set of programs which is worth the money to experienced adventurers, even without the prize.

Eureka is £14.95 from most stores.





Frankie all at sea

Anyone standing in front of Ocean must feel a bit like King Canute — there's no stopping them! Ocean recently bought the sole rights to a major portion of the assets of Imagine, the software company who shone brightly and briefly before burning themselves out. The Name, Logo and trading style are included in this deal, and a little bird tells me that eight of the programmers from Imagine have been working on a contract basis to produce "Gift from the Gods" a brilliant animated strategy/adventure game which I had a quick look at and found very impressive. "Match Day" is probably one of the best arcade versions of football for the Spectrum, allowing from one to eight players and joystick operation. We'll get our reviewer to look at it in detail for the next issue.

But to our headline, Ocean have concluded yet another deal, this time with Island records and ZTT. These are the main producers of the band "Frankie Goes To Hollywood" (What do you mean, never heard of them — Relax!). So, soon we'll be seeing them on our screen, I wonder if they'll manage to get some of their controversial ideas over in the game? I must consult Mike Read.



ACTIVITY FROM ACTIVISION

After seeing much advertising we received the latest from this experienced company. Space Shuttle is an unusual variation on the flight simulation theme, as such it demands a great deal of patience, practice and skill. If you can land your plane blindfold on one of the other simulator programs, then give this one a whirl at £7.99.

Beamrider is a fairly standard "zap the aliens" program and didn't really get the adrenalin going, but if you are a fan of this kind of program then it is one worth considering at £7.99.

Pitfall II took my fancy, it's a graphic arcade adventure game which is very addictive, has good graphics and is very playable. £8.99.

The Pencil looks interesting, a graphics and music language which has traces of LOGO in it, however it is worth looking at more closely and I'll get some-

one to review it right away! Our copy of their smash success "Ghostbusters" seems to have gone astray but we'll try and get a copy from somewhere. All I can do here is recommend that you try it out at your local purveyor of programs.

SOFTWARE NEWS

IN . . . . BRIEF

• An unusual, clever and addictive arcade game called Lazy Jones has emerged from Terminal Software at £6.95. Try it out at your local.

• Spiderman from Scott Adams has arrived. Hulk was received with mixed comments, Adventure International have probably got another winner on their hands though. We've sent it on to our reviewer for his opinion.



• Can't afford a microdrive? Fed up with long loading times? Try Quickload from Foraits Software, nicely documented and works on around 70%-80% of commercial software. For Example, The Hobbit will load in 2 mins. £4.95 from Data View, 32 Gladstone Rd. Hockley, Essex SS5 4BT.

• Hewson Consultants has released Heathrow International, Air Traffic Control. This consists of two programs, an enhanced version of their best seller and a similar simulation of Holland's Schiphol Airport. All for £7.95.

• 3D Starstrike from Realtime Software is a graphically stunning "zap em" game, one of the best! £5.95 from Prospect House, 32 Sovereign St. Leeds LS1 4BJ.

• Schooldaze is a must for your collection, watch it climb the charts! Marketed by Microsphere who produce litte, but all of a high standard. £5.95.

• CP Software, 10 Alexandra Rd. Harrogate HG1 5JS, a very well respected company, announce the latest, upgraded version of their Chess (3.5) and Bridge Player (2) programs. Both cost £9.95 from the above address.

• Mini Office from Database Publications provides a four program business tape for the amazing price of £5.95. This consists of a Wordprocessor, Database, Spreadsheet and graph and we'll get a full review on what looks a good deal ASAP.

• Hisoft have improved their Ultrakit program with the addition of a tape header reader, RUN time facilities and full compatibility with all peripherals. £9.45 from Hisoft, 180 High St. North, Dunstable LU6 1AT.

• Softstone have a range of good quality programs at a good price, Turtle Timewarp, Odyssey 1 and Force fighter cost £2.50 each.

• DK'Tronics should have gotten their Popeye program off the ground by now, and I fully expect it to be up to the same high standard as most of their other products. £5.95.

• Cheetahsoft have reduced the prices of their software to £3.50 from the usual Spectrum price. Our reviewer commented that this was about the right price and now represented good value for money.

• If you go to the Earl's Court Boat Show this year look up Eric Hutchinson who has written a couple of programs for us and has now turned his hobby into a business.

Cruisaid is his product and he recommends all owners keep at it, the benefits are there to be reaped. We wish him well.

• Look out for "The Fourth Protocol" based on F Forsyth's best selling book and published by HCP. It could be good if it lives up to its publicity.

• Only ONE ZX81 program released in the last couple of months, but it's a must for all owners as it is yet another Hi-res masterpiece from Software Farm.

Z-XTRICATOR is in the classic space zap mould but is one of the best you'll get for the ZX81, and costs £5.95. Software Farm is at 155 Whiteladies Rd. Clifton, Bristol BS8 2RG.

Don't forget, they also run a ZX81 Software Club complete with a very informative newsletter, so drop them a line.

• Come on ZX81 programmers or software houses marketing tapes, let's have them and we'll review them!

• Gilsoft, the people who gave the adventuring world the excellent Quill adventure writing utility, have now released The Illustrator. This is a graphics utility which adds graphics to the previously text-only programs produced by The Quill.

In additon, Gilsofts Gold Collection of Quilled adventures has been reduced in price to £1.99 putting them all into the budget software category, and making them very good value.

• More adventure news . . . Eight Day Software, whose range of budget-priced Quilled adventures was well received, is to be rereleased as graphic adventures (presumably using the aforementioned Illustrator), and there are to be two new additions to the range.



Why wait any longer?

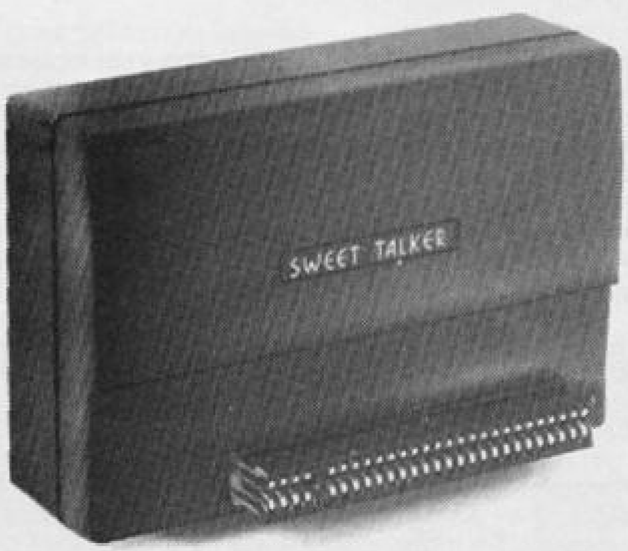
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AREAS

A suite of programs which can be used for any Sinclair computer, devised by Ian Howland and Damian Clay of Avon.

These programs are a suite, either to be put individually into a 1K ZX81, or to be put in together with the menu in a 16K ZX81 or Spectrum. Each program, with your measurements will work out the area of the following shapes:

1 SQUARE/RECTANGLE
2 TRIANGLE
3 CIRCLE
4 SEMICIRCLE
5 RING

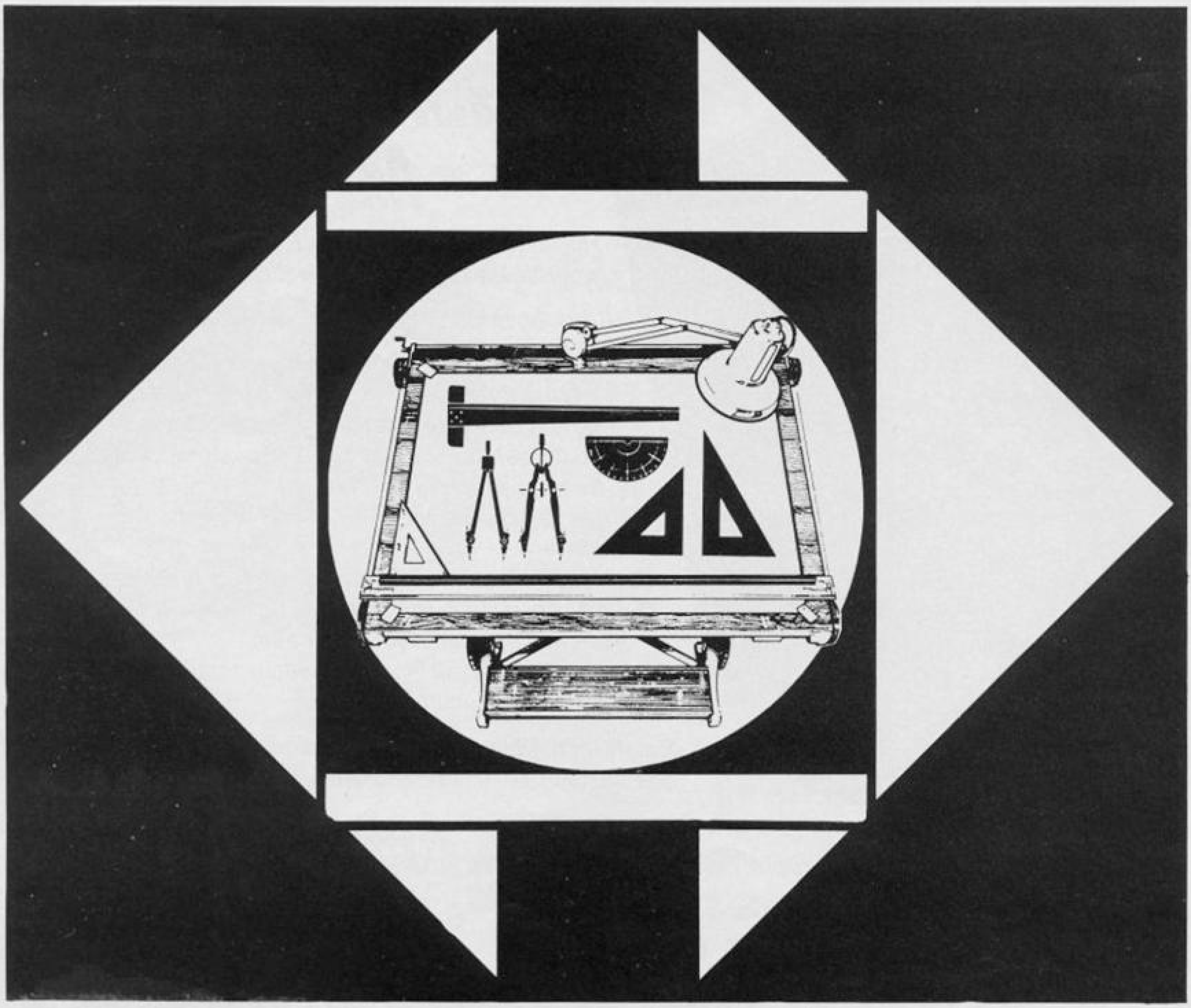
Each program follows the same pattern. First the screen clears and then asks for the first measurement, it then displays the measurement given and the programs:- SQUARE/RECTANGLE, TRIANGLE and RING ask for a second measurement.

Once all the measurements have been entered and verified, the screen is cleared and the formulae displayed. The computer then works out the answer and displays it. If you use the menu and all of the programs, then change each set of lines which say:-

PRINT AT 15,5:"HIT A KEY TO CONTINUE"
PAUSE 4E4
GOTO (1000)(2000)(3000)(4000)(5000) (depending on which routine it is in)

Alter these lines to:

"PRESS C TO CARRY ON OR M FOR MENU"
G$ = INKEY$
IF G$ = "M" THEN RETURN
IF G$ = "C" THEN GOTO (1000)(2000)(3000)(4000)(5000) (as appropriate)
GOTO (3 lines back)



```
1000 CLS
1010 PRINT "INPUT THE LENGTH: ";
1020 INPUT L
1030 PRINT L
1040 PRINT "INPUT THE BREADTH: "
;
1050 INPUT B
1060 PRINT B
1061 PRINT AT 4,5;"IS THIS CORRE
CT? (Y/N)"
1062 IF INKEY$="N" THEN GOTO 100
0
1063 IF INKEY$<>"Y" THEN GOTO 10
62
1065 CLS
1067 PRINT "FORMULAE FOR THE ARE
A OF A","SQUARE/RECTANGLE IS:","
 (LENGTHXBREADTH)"
1068 PRINT
1070 LET A=L*B
1080 PRINT "SQUARE/RECTANGLE","
LENGTH ";L;TAB 0;"BREADTH ";B;TA
B 0;"AREA ";A
1085 PRINT AT 15,5;"HIT A KEY TO
 CONTINUE"
1090 PAUSE 4E4
1100 GOTO 1000
```

Program 1

```
2000 CLS
2010 PRINT "INPUT THE HEIGHT: ";
2020 INPUT H
2030 PRINT H
2040 PRINT "INPUT THE BASE: ";
2050 INPUT B
2060 PRINT B
2061 PRINT AT 4,5;"IS THIS CORRE
CT? (Y/N)"
2062 IF INKEY$="N" THEN GOTO 200
0
2063 IF INKEY$<>"Y" THEN GOTO 20
62
2065 CLS
2067 PRINT "FORMULAE FOR THE ARE
A OF A","TRIANGLE IS (BASE X HEI
GHT)/2"
2068 PRINT
2070 LET A=H*B/2
2080 PRINT "TRIANGLE",,"HEIGHT
";H;TAB 0;"BASE ";B;TAB 0;"AREA=
";A
2085 PRINT AT 15,5;"HIT A KEY TO
 CONTINUE"
2090 PAUSE 4E4
2100 GOTO 2000
```

Program 2

```
3000 CLS
3010 PRINT "INPUT THE RADIUS: ";
3020 INPUT R
3030 PRINT R
3040 PRINT AT 4,5;"IS THIS CORRE
CT? (Y/N)"
3050 IF INKEY$="N" THEN GOTO 300
0
3060 IF INKEY$<>"Y" THEN GOTO 30
50
3070 CLS
3080 PRINT "FORMULAE FOR THE ARE
A OF A","CIRCLE IS:",,"(PI X (RA
DIUS X RADIUS))"
3090 PRINT
3091 LET A=PI*(R**2)
3092 PRINT "CIRCLE",,"RADIUS ";
R;TAB 0;"PI ";PI;TAB 0;"AREA ";A
3093 PRINT AT 15,5;"HIT A KEY  T
O CONTINUE"
3094 PAUSE 4E4
3100 GOTO 3000
```

Program 3

```
4000 CLS
4010 PRINT "INPUT THE RADIUS: ";
4020 INPUT R
4030 PRINT R
4040 PRINT AT 4,5;"IS THIS CORRE
CT? (Y/N)"
4050 IF INKEY$="N" THEN GOTO 400
0
4060 IF INKEY$<>"Y" THEN GOTO 40
50
4070 CLS
4080 PRINT "FORMULAE FOR THE ARE
A OF A","SEMICIRCLE IS:",,"(PI X
 (RADIUS X RADIUS)/2)"
4090 PRINT
4091 LET A=PI*(R**2)/2
4092 PRINT "SEMICIRCLE",,"RADIU
S ";R;TAB 0;"PI ";PI;TAB 0;"AREA
 ";A
4093 PRINT AT 15,5;"HIT A KEY  T
O CONTINUE"
4094 PAUSE 4E4
4100 GOTO 4000
```

Program 4

```
5000 CLS
5010 PRINT "INPUT OUTSIDE RADIUS
: ";
5020 INPUT O
5030 PRINT O
5040 PRINT "INPUT INSIDE RADIUS:
 ";
5050 INPUT I
5060 PRINT I
5062 IF O<=I THEN PRINT "THE RIN
G DOES NOT EXIST"
5064 IF O<=I THEN GOTO 10
5070 PRINT AT 4,5;"IS THIS CORRE
CT? (Y/N)"
5072 IF INKEY$="N" THEN GOTO 500
0
5073 IF INKEY$<>"Y" THEN GOTO 50
72
5075 CLS
5077 PRINT "FORMULAE FOR THE ARE
A OF A RING:(PI*(OUTER RAD.*OUTE
R RAD.)) -    (PI*(INNER RAD.*INNE
R RAD.))"
5080 LET B=O**2
5081 LET C=I**2
5082 LET A=PI*(B-C)
5090 PRINT ,,"RING",,"OUTSIDE R
ADIUS ";O;TAB 0;"INSIDE RADIUS "
;I;TAB 0;"AREA=";A
5095 PRINT AT 15,5;"HIT A KEY TO
 CONTINUE"
5097 PAUSE 4E4
9100 GOTO 5000
```

Program 5

```
  2 CLS
  3 PRINT AT 1,7;"THE AREA OF A
"
  5 PRINT AT 3,5;"SQUARE/RECTAN
GLE  (1)"
 10 PRINT AT 5,5;"TRIANGLE
    (2)"
 20 PRINT AT 7,5;"CIRCLE
    (3)"
 30 PRINT AT 9,5;"SEMICIRCLE
    (4)"
 40 PRINT AT 11,5;"RING
     (5)"
 50 PRINT AT 13,5;"PLEASE CHOOS
E 1 TO 5"
 60 LET G$=INKEY$
 70 IF G$="" OR G$<"1" OR G$>"5
" THEN GO TO 60
 80 GO SUB VAL G$*1000
 90 GO TO 2
```

Menu Program



Awesome *in its conception*

Brilliant *in its depiction*

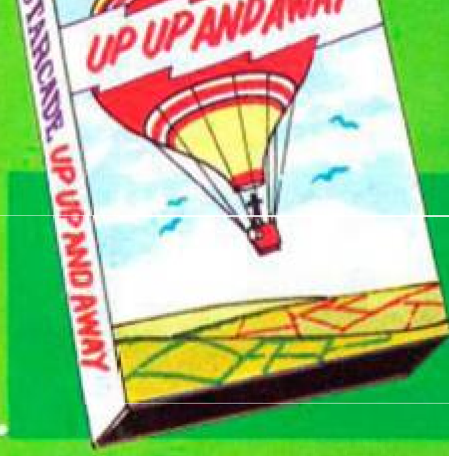
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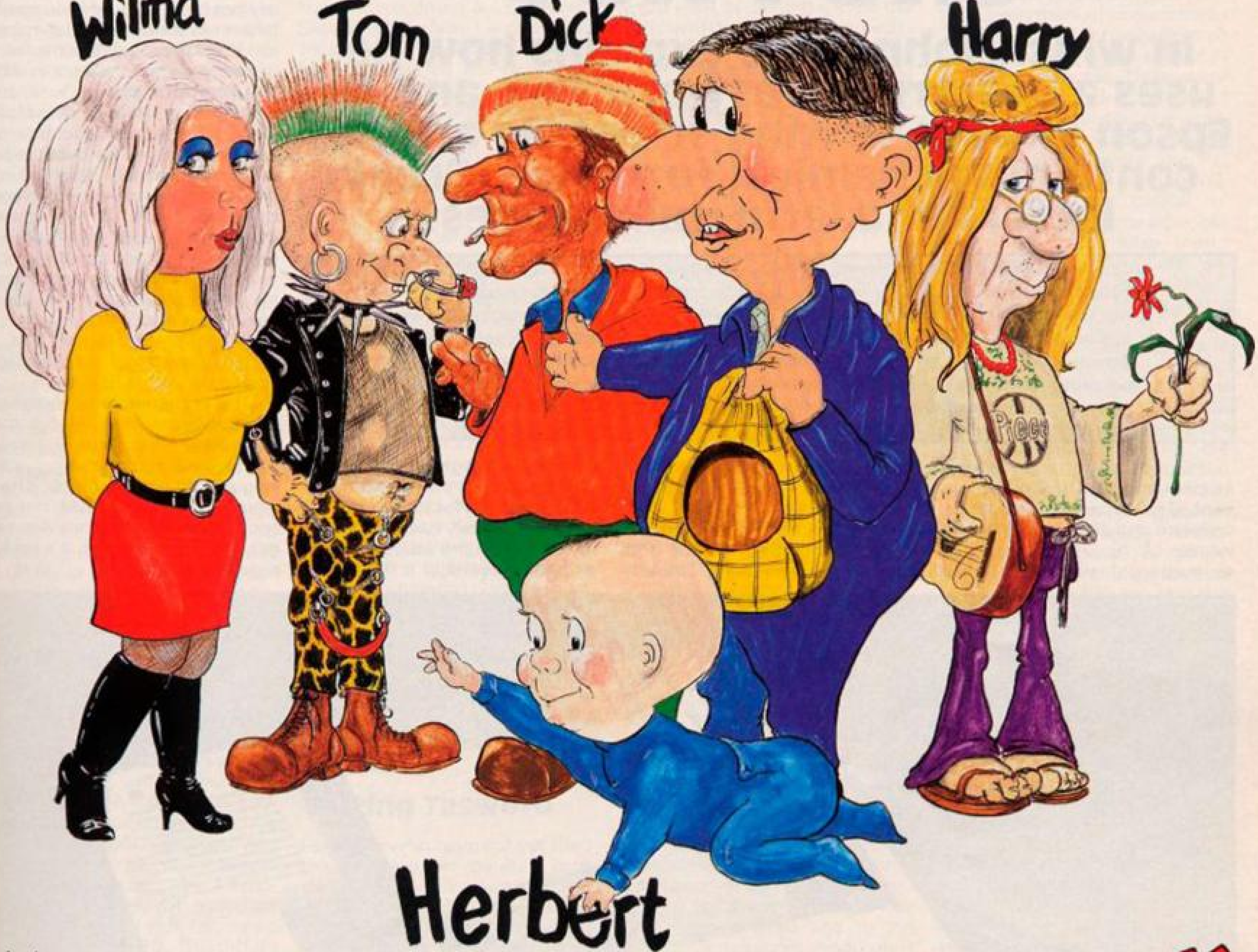
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Tasword meets the FX80

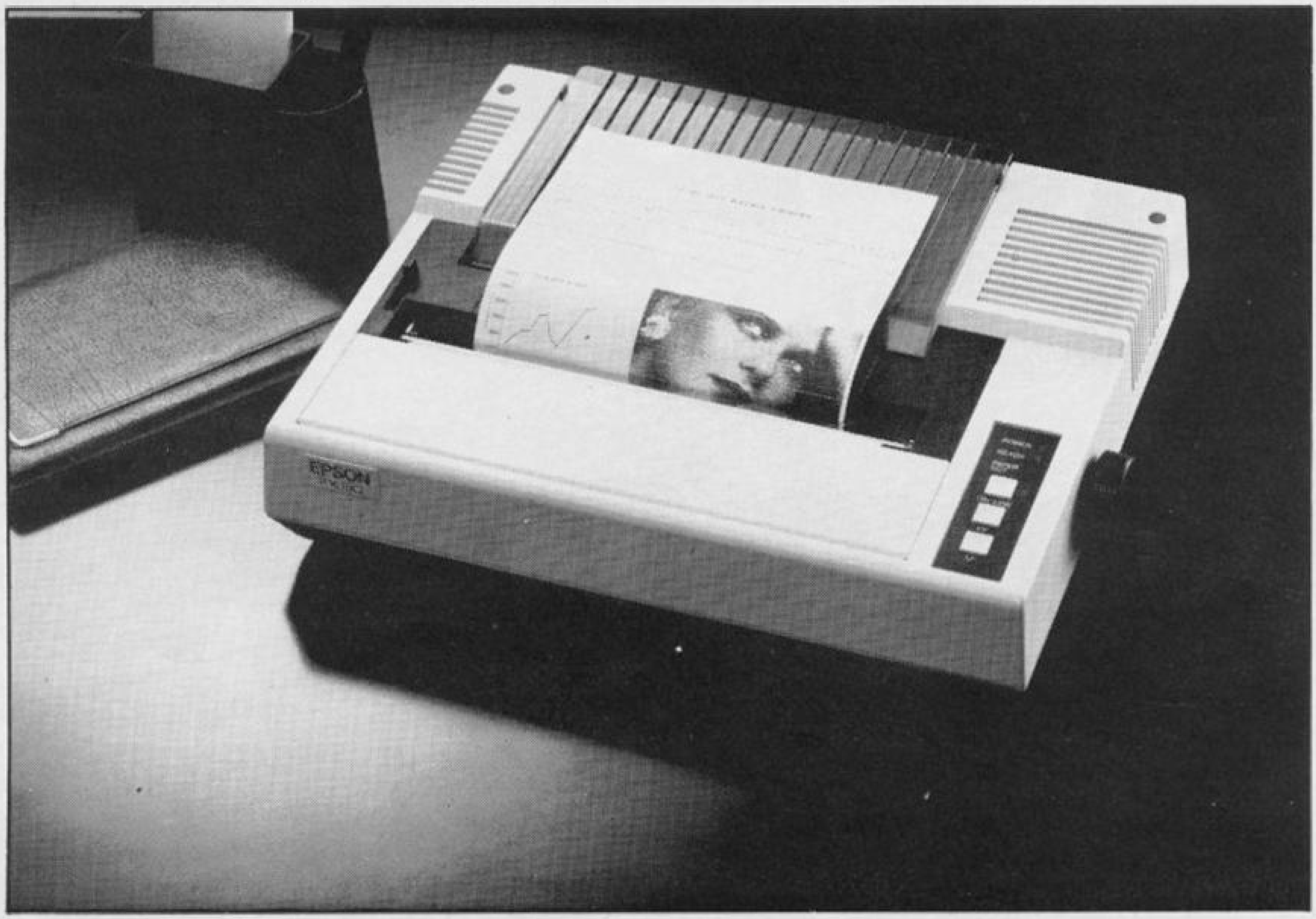
In which John Wase explains how he uses a Spectrum, Tasword Two and an Epson FX80 in writing scientific articles containing chemical formulae, Greek letters and latin-italic names.

Ectamen nedue enim haec movere potest appetit anim ned ullam habet ictum pellat peccage eronylar at ille pellit sensar luptae epicur semper hoc ut provert povultan. For natura expeting ea in motuon sit et parvos ad se alliciat et staidy non illa stabil in tant in estnian doler, non solud in indutial genelation. What gitur convente ab alia dicert rate Ectamen nedue enim haec movere potest appetit anim ned ullam habet ictum pellat peccage eronylar at ille pellit sensar luptae epicur semper hoc ut provert povultan. For natura expeting ea in motuon sit et parvos ad se alliciat et staidy non illa stabil in tant in estnian doler, non solud in indutial genelation. What gitur convente ab alia dicert rate

. . . Eventually, my research student bought a BBC micro. He kept all his experimental data on cassette and afterwards did the whole of his PhD thesis, (a monumental volume), using Wordwise and an MX80 . . . But perhaps I'd better begin at the beginning . . .

I lecture in the Biochemical Engineering Section of the Chemical Engineering Department of Birmingham University, where there are pretty extensive computational facilities, (which, I confess, I rarely use). Although my postgraduate student (from another University) arrived with virtually no knowledge of computing, he rapidly became computer-literate. He then bought his own BBC and, subsequently, an Epson MX80. A little after this, I acquired a 48K ZX Spectrum , and I often used to get my leg pulled by young Nick, my postgrad., about how much better his set-up was than mine, proof being provided in the form of many pages of thesis in dot-matrix draft, (just as well; his writing was always dreadful). Now, I write a fair number of scientific articles for publication in learned journals, this writing often being done at home and the advantages of having my own word-processing facilities were being made painfully obvious by my student. In addition, his conviction that he had been able to put one over me with his installion so irked me that I began to try to find out just what I could do with a Spectrum.

The first question concerned the Spectrum itself. Had it the capability? "Yes, but . . ." said my learned common-room colleagues. "It can do the job; it has plenty of available RAM, but its squidgy rubber buttons are no good for touch typing. It's really a games machine . . ." Well, I



had a vague idea that professional keyboards could be obtained, although at the time I had no idea of the difficulties that would be encountered. (Because of his, keyboards are going to be dealt with in a separate article). In any case I was probably committed by this time, for I had already started to answer the next question. This concerned the program I should choose. Of the word processing packages available, Tasword, and subsequently Tasword Two, received uinstinted praise in a range of reviews. So Tasword Two was duly obtained.

The next necessity was a printer, which had to be able to cope with scientific reports of the worst possible type as far as printing is concerned. Our research often involves the growth of a yeast, mould, or bacterial strain, all of which have to be correctly cited by a pseudo-latin name, (just like the botanical name of a plant), inserted willy-nilly into the text, in italics. Printing of chemical formulae is frequently necessary to describe accurately the materials used. Physical analysis of equipment often demand the printing of equations with mathematical/Greek symbols. Methods of citing references differ between journals, so it is essential that a word processor can change, say, a system of citing authors in the text to one involving numbering, (perhaps in square brackets, or even by the use of numbers superscript). All of these constraints suggested the use of a good quality dot matrix printer, rather than the daisy-wheel type; this also has the advantage of a range of standard typefaces. In the end, I plumped for the Epson FX80. This differs from the RX80 in three main respects. First, it is dearer. Secondly, the print speed is a little faster, and third, it has an internal RAM which can either act as an enhanced buffer, or alternatively can be used for downloading the character set which the FX80 holds in its ROM; this duplicate set, now in RAM, can then, in theory, be modified by the user to provide Greek letters, mathematical symbols or whatever else you like. For the Spectrum this is not altogether straightforward, and the procedure will therefore be described in this article in detail: The ESCape codes might differ for other makes of printers, but the general principles remain the same.

Finally, an interface was necessary. The reader probably already knows that there are two sorts of interfaces in general use: the centronics or parallel type in which the information is transmitted in parallel down the familiar ribbon cable, and the RS232 or serial type in which the information is all transmitted down a single line. Sinclair's Interface 1 is of the latter type, but its purchase would have committed me to a corresponding RS232 interface in the printer. Epsons come with centronics as standard and RS232 available at extra cost. Sinclair's Interface 1 is also quite pricey; not surprising in view of the fact that it has the additional circuitry to control microdrives. I had no wish to commit myself to microdrives, (which are totally dedicated to the Spectrum), for I had already decided to get, as far as possible, good quality peripherals which could still be used if the central computer was changed. My rationale with storage devices was, therefore, to be patient until a suitable disc system came along (more of this in a later article). So I avoided Interface 1 altogether and instead chose a centronics interface. Reports at that time suggested that the Kempston was the most popular, and so, like our Editor, that's the on I got — the bog-basic sort with a tape of driver software and no on-board EPROM, for these were not yet available (probably fortunately, see later). And there I was, ready to go.

Testing Tasword

For those who have not yet tried this program, let me start with the good news; it's excellent. By redefining the character set on an 8 × 8 pixel matrix, the standard 32 line display is replaced by a 64 column screen, all ready to receive typing. Almost everything the reviewers say is true. It's easy to use, very user-friendly and the 64 character screen is perfectly easy to ready. So what are the problems?

Well, the best way I can deal with these is to go through them, one by one. Tasword is easy enough to adapt to the Kempston interface by loading, entering Basic, executing a number of POKEs and then saving the result; I could then type in the text, execute STOP, and the menu of choices for printing a page would come up. And this is where the first real snags started to crop up. Tasword comes, as you probably know, with counters for the 320 lines and 64 columns, and with word-wrap and right-justify. Word-wrap simply means that if a word is too long to fit on the line, the whole word is transferred to the start of the next line. The right-justify facility then pads out the line with extra spaces so that the last letter of the last word ends in column 64, (if the full width is being used). Tasword is carefully idiot-proofed to recognise full stops, and will jump to a new line after a punctuation mark. This means that it will split a decimal number quite cheerfully. This is not catastrophic, but needs watching. However, a more abstruse problem was occasioned by insertion of italics in the text. Try typing "The test organism was *Saccharomyces cerevisiae,*" (a yeast, to the uninitiated), in the middle of some text and see what happens. If the words are in the middlle of a line, this is then printed out two spaces short of justification. Calamity . . . The problem clearly arises because the printer control codes, shown by Sinclair's graphics symbols, have to be visible on the screen. They thus occupy space. The program cleverly removes them and adds them as spaces at the end of the line.

So, this was a problem. I thought perhaps I might get round it by redefining the printer control codes. Unfortunately, I'm a bit dumb, and the Epson FX80 manual is written for someone who already knows what he's about: everything's there if you can understand it. I couldn't.

So, I dropped a line to Tasman to ask about the lack of justification and to ask for a sample control code definition; I asked for a superscript. Their reply was prompt and to the point; "Superscript mode on is ESC S $(0)_D$, so define a graphics symbol to be 27 83 0." I looked in the Epson manual and found that the expression for the superscript mode setting was CHR$(27);"S"CHR$(0);. Given that the ASCII code for S is 83, the thing is obvious. Their other suggestion; "Define a space with the graphic" worked well with pseudo-latin until, when I reformed a paragraph, the latin name happened to start a line, when of course, there was an additional space. The way around this problem was to sacrifice another graphics facility — this time shifted 6, replacing double-strike with double-space, (32,32). I thought the printer might object, but no. The text is typed, a rough copy is made, the material is discussed and revised, and at the end of it all, appropriate double spaces or pads are inserted before printing. Works like a charm!

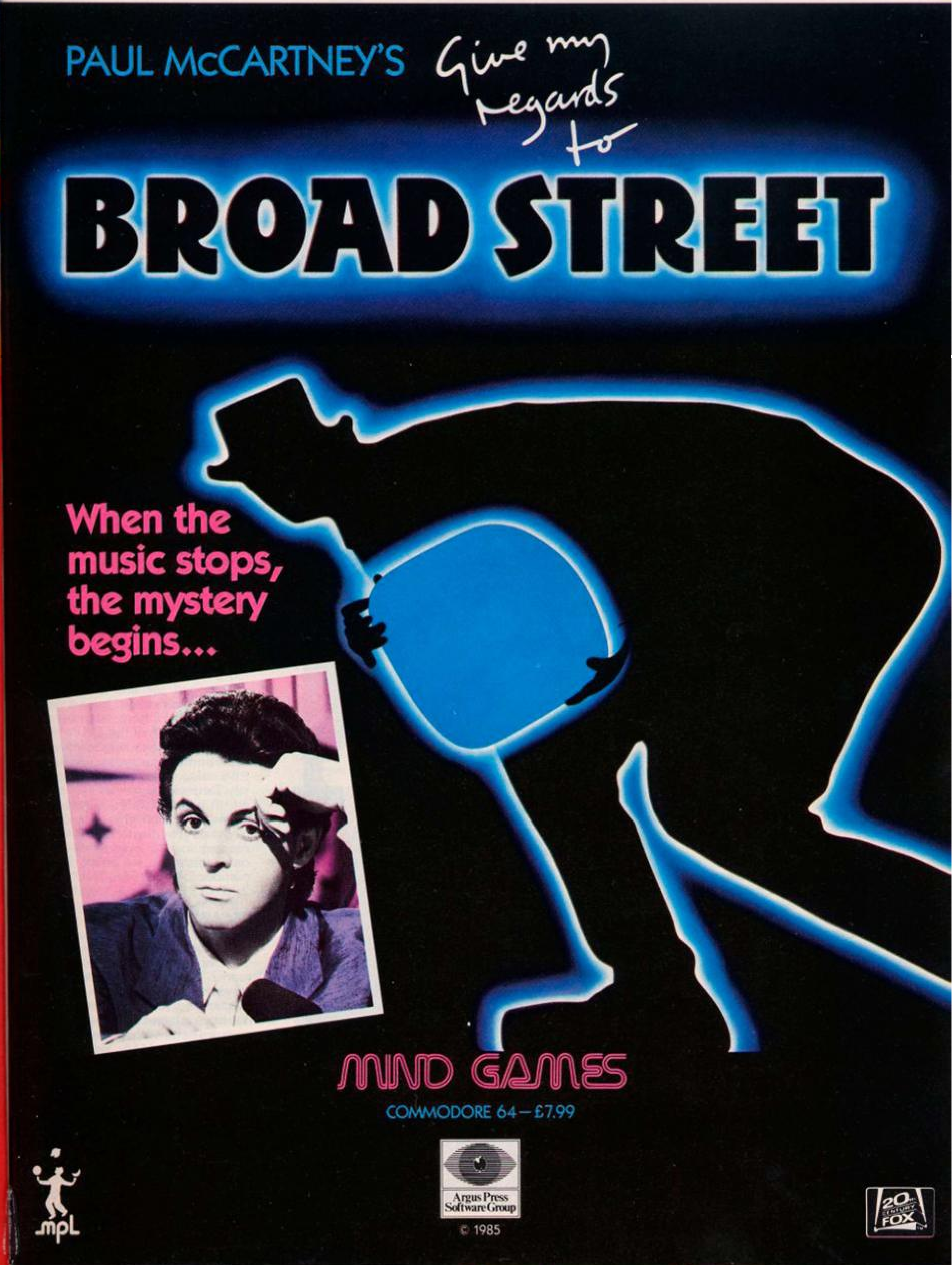
By this time I was so confident that I decided to have a go at subscript and superscript printing. The code for superscript was translated from the Epson manual to decimal as 27 83 0; that for subscript as 27 83 1; and that for cancel as 27 84 in each case. These went on graphics 8 and 7, instead of elite and proportional typefaces. This, in turn, gave me a number of problems. Things like °C usually worked out without difficulty; (note that capital 'o' gives a far better degree sign); but when I got to formulae, then I really started getting into difficulties. Fundamentally, Tasword's use of the graphics symbols as control codes distorts the "what you see is what you print" ideal, in that they are removed to the end of the line, after the page has been displayed, but before it has been printed. Chemical formulae need so many control codes that there is a large gap at the end of the line to be filled. So, graphics 6 unshifted was rapidly redefined as a triple space. As the example shows, formulae such as sodium molybdate *can* be printed. The spaces between the words get rather large, but not unacceptably so. Even reasonably simple equations can be printed out without too much difficulty.

Of course, the redefinition of so many control keys limits some of the other things that one can do, but it is possible to have several versions of Tasword Two, and use them sequentially. (I normally use two). For certain applications, such as when you have an equation where one side, (something over something else), equals a single cypher, half line spacings are necessary; it is easier to do this directly from the BASIC. This control code limitation is the only difficulty I have experienced in a program which is exceptionally user friendly, and which offers so many facilities at such a low price. Let's face it, the professional typists in our office use a program which costs more than twenty times the price of Tasword, but which offers little more; just look at what it can do!

In the next issue I'll be going into detail on how to make the printer produce those special characters that are never in the predefined selection but usually become essential. Although I wlll concentrate on scientific formulae, the method will be the same for all applications. ■



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Across The Pond

Telecomputing across the U.S. by Mark L. Fendrick

One of the most eagerly awaited add-ons for the Timex/Sinclair computers was the modem. Timex had announced a modem that was scheduled for release in November of 1983, which was to be compatible with both the T/S 1000/1500 (ZX-81) and T/S 2068. This was dubbed the T/S 2050 Telecommunications Modem. Unfortunately, Timex went out of the computer market before they received the first shipment. After a short delay, Westridge Communications, a division of Anchor Automation, released the modem that they were producing for Timex, and the Timex/Sinclair 2050 is now known as the Westridge 2050. The cassette that comes with the modem (SMART TERMINAL I) has the T/S 1000/1500 software on one side, and the T/S 2068 software on the other. An advanced version of this software, called SMART TERMINAL II, allows for the storage of up to fourteen telephone numbers with log-on instructions, and the ability to upload and download. It attaches to either computer via a 12 inch RS232C cable which ends in a Timex interface (built in) which then connects to the edge expansion bus. The connector is of the piggy-back type so that other peripherals may be added. The set-up for both computers is identical, with only the software differing. The modem connects to Ma Bell's (the American version of BT) equipment directly, and has a phone jack built in so that you may connect a telephone to your modem, although that is not necessary. In fact, you do not need a telephone at all. Set-up of the modem takes just a moment and you are ready to go. A second modem is available from the Byte-Back Company (Rt. 3, Box 147, Brodie Rd., Leesville, SC 29070; (803) 532-5812) who introduced the first modem ever available for the T/S 1000. Their current offering is compatible with all modems.



Bulletin Board

Once you are set-up, what can you do? There are a number of private Bulletin Boards run by computer enthusiasts for the purpose of giving people a place to get to know others with similar interests. A number of these Bulletin Boards (BBS's) are specialised boards that cater to either a particular micro or other interest. Many of these offer a place to send and receive messages to and from the other users, a section to upload (send) or download (receive) programs and/or text, or any other type of section that the SYSOP (SYStem OPerator) can think of. Best of all, there is no charge for the time you spend online, except those which are levied by the telephone company for a regular call. A number of BBS's exist which contain sub-boards dedicated to the Timex/Sinclair computers, and there is even one that is entirely devoted to our micros. This is run by ZEBRA SYSTEMS, Inc. of Woodhaven, New York. ZEBRA SYSTEMS is a company which develops and sells software and hardware for the T/S computers. This is a place where all T/S owners can log-on and discuss their successes and ask any questions they may have about using their equipment. There are sub-boards for each of the T/S computers as well as a sub-board on telecommunications. ZEBRA BBS also has two Sinclair newsletters that may be accessed. In addition, there is a Merchandise section where you can browse through ZEBRA's catalogue, and even place an order while you are online. The number of this BBS is (718) 296-2229.

MCI Mail

How about sending your mail directly from your computer room? There are a number of services that allow you to do this, even if the recipient does not have a computer. The most comprehensive of these is known as MCI MAIL. Here too, there is no charge for online time, but you pay for the messages sent, depending on the type of communication. If the person you are sending the mail to has a computer (or terminal), and is registered on MCI MAIL, you can send an electronic message of up to 7500 characters (about 3 typewritten pages) for a fee of only $1.00.



This message is transmitted instantaneously and will appear in the recipient's INBOX the next time he signs on. (Registration on MCI is free-call (800) MCI-2255.) If you want to send a letter to someone who is not registered, you can send a first class letter of the same 7500 characters for only $2.00. This letter is laser printed at an MCI facility near the letter's destination, and put into the U.S. mail. Your letter may even be printed on your own letterhead with your signature. For an additional fee you can have either overnight delivery or four hour delivery. Additionally, your registration on MCI mail gives you your own telex facilities. This gives you the ability to quickly send messages all over the world. My communications with Ray at ZX COMPUTING have been by Telex, as have been the contacts, I have had with many vendors in the U.K. To reach me via telex, my number is: 6502163495 MCI. My U.S. readers may reach me on MCI by name. (The day I finished writing this column, MCI announced that in January of 1985 all of their services will be available to and from over 40 countries, so many of you will be able to sign up and contact me directly.)

Online services

Like your PRESTEL, we have a number of commercial online services which can be accessed via a modem. Unlike PRESTEL, these services are monochrome without graphics. Almost every day new ones are announced, but the two major ones are THE SOURCE and COMPUSERVE. Both require an initial sign-on fee, and have an hourly charge. (The Westridge modem comes with a waiver of the initial $100.00 sign-on fee for THE SOURCE.) For each you are issued an ID number and password.

One of the most popular features of both services is the electronic user-to-user mail. On THE SOURCE you can even create mailing lists so that a single message may be sent to numerous people at one time. This is the manner in which the newsletter of the Sinclair Information Network is "mailed". Messages may even be sent which require the entry of a prearranged security code before they may be read.

On COMPUSERVE, there is a feature which is called CB. Sixty channels simulate the use of a citizens band radio, where dozens of people can get together to converse in real-time. It does tend to get a little confusing for the first time user, but can prove interesting once you get the knack of it.

Another very popular feature of COMPUSERVE is the Forum or Special Interest Groups (SIG). Here, users with similar interests can get together and discuss the subject. The Forums have three main areas. The first is a bulletin board section where messages can be left, read by all, and responded to. The second area is a data base where files (text or programs) may be uploaded and downloaded. The third section is the conference area where regularly scheduled get togethers take place. Often, a guest "speaker" is invited to take part. Such as Forum exists for the benefit of Sinclair users, and each Wednesday night there is a conference of Timex and Sinclair users. To access this Forum, type GO CEM 450 at any system prompt.

The counterpart on THE SOURCE is called Participate. You access this by typing PARTI at the system prompt. There is only a message base, without any data base or conference area, but there are hundreds of organised discussions. There is one titled Sinclair Info Net which is open to all who want to join.

Both services contain full up to the minute stock market reports, airline schedules, employment services, newswires, weather reports, and of course, games. I may be contacted either on THE SOURCE (BCA632) or COMPUSERVE (74216,1245). I look forward to hearing from you.



Software

In the continuing search for new resources for software that is compatible with our computers, let me say that many dealers in the U.K. have heard our cry and are responding. I will try to keep you informed of the results of that search in each of these reports.

Although the market has dried up in the U.S. when it comes to T/S 1000/1500 software, such is not the case in the home of Sinclair Research. I have seen a number of fine ZX-81 programs which will work on the T/S 1000/1500. One such cassette comes from Cascade Games Limited (Suite 4; 1-3 Haywra Crescent, Harrogate, North Yorkshire, HG1 5BG, England). They produce a package of 50 games on one tape, and there is a version for both the ZX-81 and Spectrum. Each tape contains 50 games written in BASIC, many quite spectacular. The ZX-81 version will work on the T/S 1000/1500 computers, and most of the Spectrum games will work on the T/S 2068. Those of you who have either a Spectrum Emulator, ROMSWITCH, or Spectrum ROM, will find of course that all of the games will work just fine. The cost is $19.95 (including p&h) direct from Cascade.

Although the Adventures from Richard Sheperd Software (Elm House, 23-25 Elmshott House, Chippenham, Slough, Berks, England) will not work on the basic T/S 2068, they will work on one with one of the devices mentioned above. (With the possible exception of Inferno, which will not LOAD with my Emulator.) They have a fine range of games from the classic Adventures (with high resolution graphics to go along with the text), as well as an interesting 3-D maze game (Transylvania Tower), and a few others which don't fit into either category. I personally have spent many hours trying to master Ship of the Line. Write directly for price and ordering information.

Next issue we will take a look at an exciting new development in Sinclair graphics capabilities. See you then.

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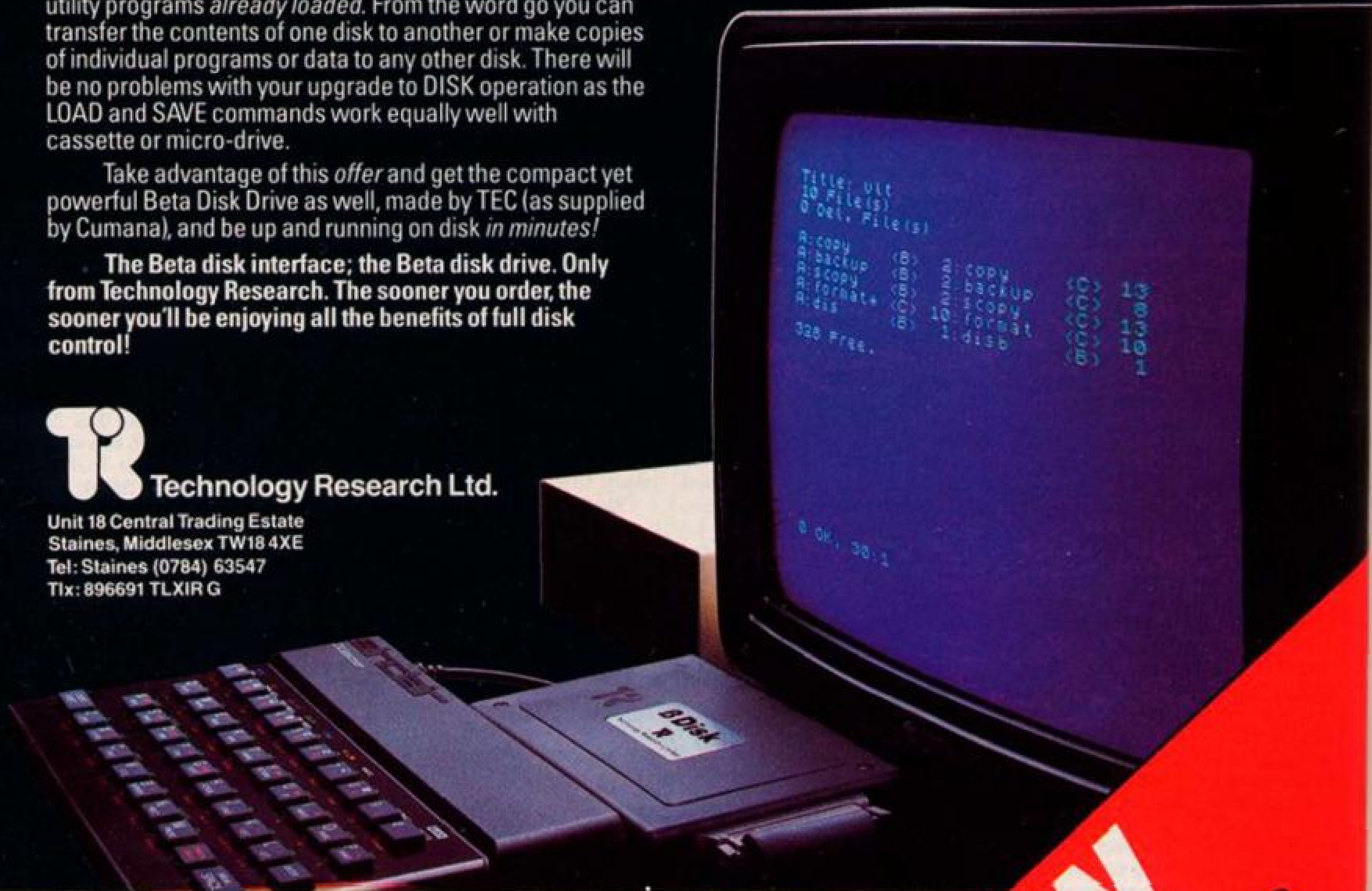
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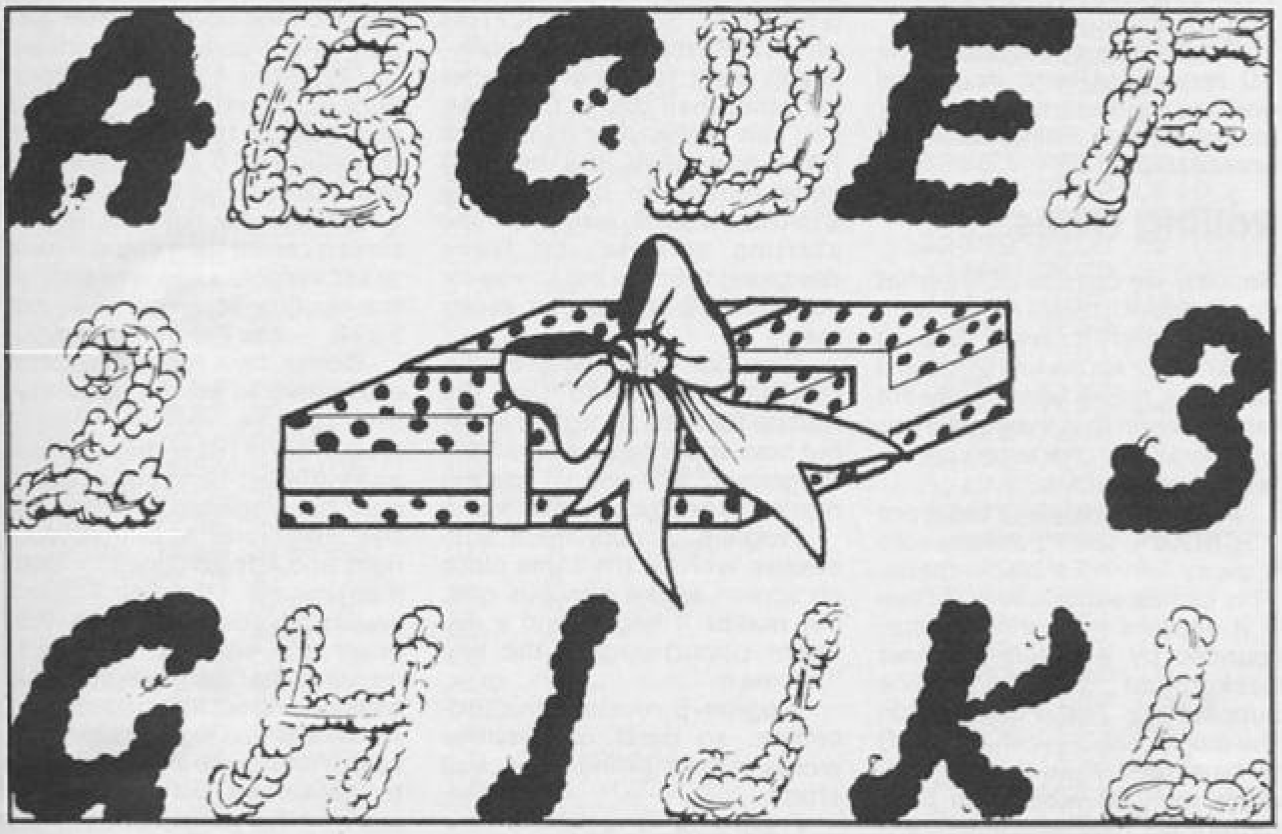
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A PRESENT FROM UNCLE

Our thanks to Psion for letting us use their routine and to regular Exeter contributor Clyde Bish for explaining how to use it to the full.



Aren't we lucky having a kind Uncle — or should it be Sir Uncle? — who gives us a present with our Spectrums! No, not the "Horizons" tape per se, but a particularly useful routine hidden within its bytes. If you'd like to have titles and messages in large letters, Horizons style then read on. All will be revealed.

It's all done by a machine code routine LOADed to address 32256 (these are the bytes which autoLOAD before a Program RUNs). Like most presents you have to know just what it will do before you can use it to best advantage. Here are some ideas.

First things first. How does the routine work? I'm not going to bore you with details about the mechanics of the code. If you want to "dissect" it, a disassembly is given in Table A. Suffice it to say that information on width and height multipliers (variables xs and ys respectively), codes of characters to be PRINTed, vertical start position, and horizontal start position (calculated by the program) are fed into the printer buffer. This is simply used as a convenient dump from where the routine will pick up the information it needs. (If you've wondered why anything LPRINTed after the print routine has been used is preceeded by a black band, this is the information still left in the buffer) The machine code routine searches the ROM character table for the character to be printed, then produces a pattern of pixels on screen which is xs times wider and ys times taller than the original. If you want to see how this works type in and RUN Program 1. This is a Basic simulation of the routine. It's slow, but it will demonstrate the principles. (Incidentally it does produce quite nice titles in its own write (sic) Try it and you'll see.

But more of the mechanics later. Let's see the routine in action. First you need the routine in the machine. Simply type

```
CLEAR 32255: LOAD "c"
CODE 32256
```

Press ENTER and play Side B of your Horizons tape. You'll get some programs and bytes listed first but after about 2 minutes the code you need will LOAD in. When the O.K. message appears, stop the tape, type in program 2, RUN it and experiment. For example, try 2 for width and 3 for height. You'll find that the letter H which appears will be twice as wide and three times as tall as normal. Try 5 and 2. This time the H will be 5 times as wide and twice as tall as usual. The width limit is 32. (Try answering the INPUT prompts with 32 and 1!). Anything wider will 'wrap". Try a width of 40 to see what I mean. The height limit is 22. Anything larger will prove problematic!

When you've experimented for long enough, break out of the INPUT with STOP, then LIST. The listing before you is the most important you'll come across with regard to the Print routine. It's the driver which supplies the routine with the information it needs to operate. So, let's have a close look. As you already know, xs is the width multiplier and ys the height multiplier. Variable yy is the distance down the screen (in pixels) — 0 is the top row, and p$ the character(s) to be PRINTed. The subroutine to load this information into the printer buffer starts at line 9998. Variable xx — the start position across the screen — is calculated first to ensure that the printing is central on screen. We'll put this line to more effect (or over-ride it!) later. The POKEs in line 9999 put the variables into the buffer (along with an 8 and 255 as markers) before the machine code routine is called by the USR command. After printing, a return is made to the main program.

Before we leave the driver subroutine try the effect of altering yy (edit line 30). Similarly p$ can be changed — try more than one character. To see the effect of line 9998 add lines

```
45 LET xx= (any value,try 0)
47 GOSUB 9999:GOTO 60
```

At this point, it would be a good idea to SAVE the BASIC subroutine and code, ready to merge it with your programs in the future, rather than having to keep finding it on the Horizons tape. To do this, delete lines 1 to 70, leaving just the subroutine, add line.

```
9997 CLEAR 32255:LOAD ""
CODE:STOP
```

then SAVE both program and code using

```
SAVE "print"LINE 9997:SAVE
"c" CODE 32256,300
```

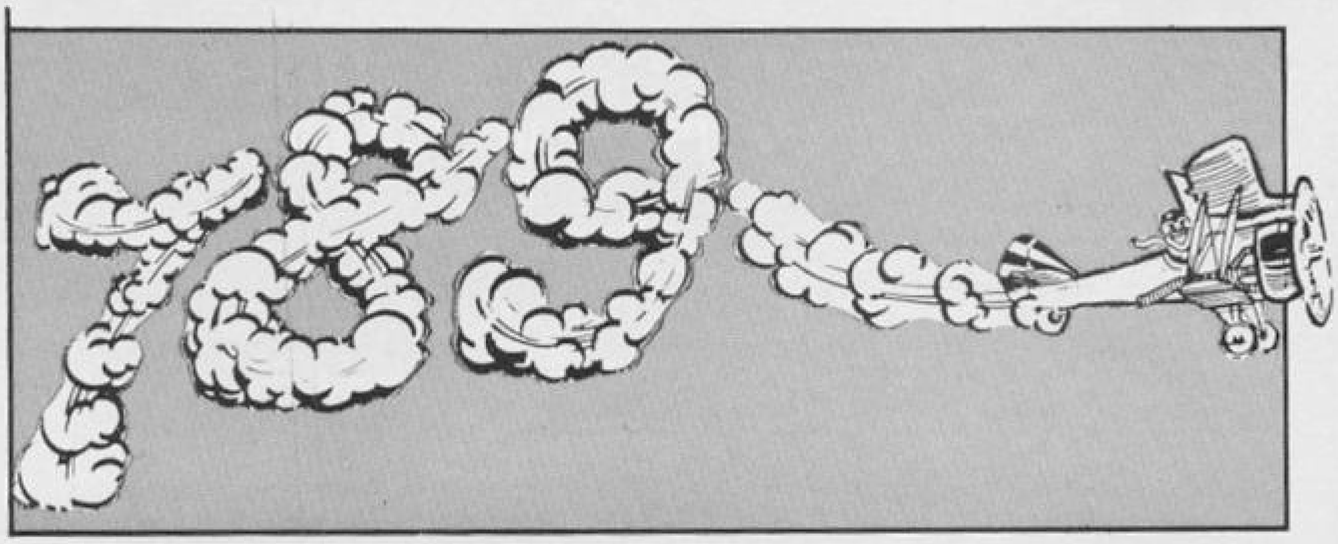
and VERIFY both program and code.

O.K., you've seen the good news; now the bad. The problems. If you 48K owners have tried LOADing the code into a high address, you will have discovered that calling it causes a "crash". You'll find the reason staring you in the face in the disassembly (Table A). Look at lines (addresses) 32341, 32361 and 32409 and you'll see the letters (op code) JP followed by a number. This is called an absolute jump. It means that when the routine reaches this point it will jump to the address given. This is cor- ▶

rect if you've loaded the code in at 32256 but start anywhere else, and all the jumps will be wrong. Hence the crash. The answer — alter the addresses. Program 3 (supplied by our illustrious Editor) will do just that. In essence what it does is to POKE new (corrected) values into those JP commands, the values being calculated from where you start. SAVE it with

SAVE "print" CODE (start address), 300

and remember to CLEAR (start address — 1) before you LOAD it back in as part of a program. One word of warning. Don't answer the "start address" prompt with a value greater than 65067 or you'll lose the end of the routine!



UDGs

That's relocation solved, now for problem two. Run Program 2, but first replace the "H" with a user-defined graphic (UDG for short). Any letter will do. What appears on screen? Nothing. The reason for this is again found in Table A. Look at the line of op code at address 32272. The number in brackets is the address of a system variable called CHARS. This holds a two byte (number) value — normally 0 and 60 — which tells the computer where to look (in the ROM) for the character set — the 8 x 8 patterns of pixels which make up each of the characters. The Print machine code looks through this set to find a match for the character you want printed. As *you* design the UDGs no match is found — hence the blank screen.

The solution to the problem is quite simple (although it took me some time to fathom.) What you have to do is convince the machine that the character set it wants to look at is not in the ROM but up in the UDG area. Look at Program 4. Line 5 is there simply to make the UDGs different from normal capitals (by underlining top and bottom). In line 10 "ABCDE" must be entered in Graphics mode, although they won't appear underlined until after the program is RUN. The POKEs following are the key. They tell the machine that the set it wants begins at address 64216 (216 + (250 × 256)). USR "a", the first byte of the UDGs is at 65368. The difference, 1152, divided by 8 (the number of bytes/character) is 144, and 144 is the code of the first UDG! If the logic of this has lost you, don't worry, just POKE 216 and 250 (216 and 122 if you have a 16K machine).

The POKEs at the end of line 20 reset CHARs to its orginal position. Otherwise the error messages and listing would be unreadable.

Rolling titles

So, now we can use UDGs what do we do with them! (Apart from their straightforward use in titles). Here's a couple of ideas. I call them rolling titles. They are interesting in that they make use of the ROM character set to redesign the UDGs.

Program 5 displays the word "SCROLL", then gradually rolls it away leaving a blank space. This can be especially effective if it appears in a window surrounded by a different colour background. The DATA line supplies the first POKE within the loop in line 5, with the UDG to be altered, then the start address in ROM where the pixel pattern for the replacement letter begins. Refer to Table B and you will see that 16024 is the start of S, 15896 of "C" and so on for the word SCROLL. The reason for alternate UDGs being redefined becomes apparent in the second POKE. This POKEs the unaltered UDGs between, with 0 — a blank space. The letters for p$ in line 10 must be entered as UDGs (as yet not redefined). When the program RUNs, it displays the POKEd patterns, but moving up one byte each time it loops in line 10 so that the top line is lost and the blank lines of the redefined spaces move in to take the place. The best way to understand how this program (or any other) works is to put in a word of your own. (If you want other than 6 letters then you will have to alter the limit number in the f loop of line 5.) Use Table B to get the DATA numbers you need, and remember, the UDGs must be used alternately. Good luck.

Program 6 is an extension of this roller idea where, instead of blanks, a second word (TITLES) is redefined. So, as SCROLL rolls off, TITLES rolls on. Incidentally, if you want to use a character set other than that in the ROM, you can define your own in the RAM and point the machine code routine to it by setting CHARS to 256 less than the starting address. I'll leave designing the new set to you (or you can crib it from an earlier mag.)

Now for something easier. Obviously you can use the routine for titles, Horizons style, but how about some animation? Programs 7,8,9 and 10 use the routine to produce such effects.

Program 7 puts each successive word in the same place on screen as the previous one, but makes it larger (and a different colour) so that the title "zooms in".

Program 8 reverses this procedure, so parts of previous words remain giving a blocked effect.

Programs 9 and 10 are similar to Program 8 but also move the print position so that the title shifts up or down the screen giving a perspective effect.

Clearing the screen

And now for something completely different. Spaces. The routine will quite happily print these and give interesting CLS effects. Actually, it's more of a "wipe". programs 11 and 12 will demonstrate. The former clears the screen in a series of 8 left to right wipes starting at the top, whereas the latter clears in a series of vertical lines starting from the left. In each case line 10 just fills the screen for wiping. Try experimenting with other values for xs and ys. (xs must divide exacty into 32). If you add a statement such as PAPER 4 then you will clear and change the screen colour at the same time.

You can also use the printing spaces technique to clear just part of the screen (a window). Try Program 13. This will produce a central cleared area 48 pixels down from the top, with the window 16 characters wide and 8 deep. If you want to clear a window to right or left of screen centre then you will have to set variable xx as well and call the routine at line 9999, not 9998 — see Program 14.

Computers normally print characters to screen by justifying to the left — like a typewriter. That is they produce a straight left-hand and a ragged right-hand margin. A book (or this magazine) is printed with right and left justification. Both margins are straight. A word processor does the same. Program 15 justifies to centre, meaning that each line of print is balanced about the mid line and so the left and right margins are even. This gives a pleasing look to on-screen instructions. In outline, the program takes the contents of the string held in a$, chops it up into lines of maximum length 32 characters, without chopping words, and then uses the machine code routine to balance each of those lines centrally on screen. As printed, the listing gives normal size characters, but you could, for example, change to double size by altering ys and xs to 2, and changing all 32s to 16 and 33s to 17.

To end, here is a Really Useful Program (as Pooh would say.) Program 16 will produce cassette lables if you have a printer. The titles are printed twice normal print size, and appear both on the spine and on the side of the lable. The straight lines printed show you where to fold to fit the box. If you want to make a complete cover for the side (and can afford the paper) add some LPRINTs before COPY to make it long enough.

Well, there are the ideas. From now on it's up to you. Have fun with Uncle's present!

12345

Table A

```
32256 7E00 210F5B     LD    HL,23311
32259 7E03 7E         LD    A,(HL)
32260 7E04 23         INC   HL
32261 7E05 22005B     LD    (23296),HL
32264 7E08 6F         LD    L,A
32265 7E09 3C         INC   A
32266 7E0A C8         RET   Z
32267 7E0B 2600       LD    H,0
32269 7E0D 29         ADD   HL,HL
32270 7E0E 29         ADD   HL,HL
32271 7E0F 29         ADD   HL,HL
32272 7E10 ED4B365C   LD    BC,(23606)
32276 7E14 09         ADD   HL,BC
32277 7E15 3E08       LD    A,8
32279 7E17 32045B     LD    (23300),A
32282 7E1A 3A0B5B     LD    A,(23307)
32285 7E1D 32095B     LD    (23305),A
32288 7E20 3A0A5B     LD    A,(23306)
32291 7E23 32085B     LD    (23304),A
32294 7E26 3E09       LD    A,9
32296 7E28 32055B     LD    (23301),A
32299 7E2B 7E         LD    A,(HL)
32300 7E2C 23         INC   HL
32301 7E2D 22025B     LD    (23298),HL
32304 7E30 07         RLCA
32305 7E31 32065B     LD    (23302),A
32308 7E34 3A055B     LD    A,(23301)
32311 7E37 3D         DEC   A
32312 7E38 2032       JR    NZ,7E6C
32314 7E3A 3A045B     LD    A,(23300)
32317 7E3D 3D         DEC   A
32318 7E3E 2018       JR    NZ,7E58
32320 7E40 3A0E5B     LD    A,(23310)
32323 7E43 47         LD    B,A
32324 7E44 3A0C5B     LD    A,(23308)
32327 7E47 4F         LD    C,A
32328 7E48 3A0A5B     LD    A,(23306)
32331 7E4B 81         ADD   A,C
32332 7E4C 05         DEC   B
32333 7E4D 20FC       JR    NZ,7E4B
32335 7E4F 320A5B     LD    (23306),A
32338 7E52 2A005B     LD    HL,(23296)
32341 7E55 C3037E     JP    32259
```

```
32344 7E58 32045B     LD    (23300),A
32347 7E5B 3A0D5B     LD    A,(23309)
32350 7E5E 47         LD    B,A
32351 7E5F 3A095B     LD    A,(23305)
32354 7E62 80         ADD   A,B
32355 7E63 32095B     LD    (23305),A
32358 7E66 2A025B     LD    HL,(23298)
32361 7E69 C3207E     JP    32288
```

```
32364 7E6C 32055B     LD    (23301),A
32367 7E6F 3A0C5B     LD    A,(23308)
32370 7E72 47         LD    B,A
32371 7E73 3A095B     LD    A,(23305)
32374 7E76 32075B     LD    (23303),A
32377 7E79 3A0D5B     LD    A,(23309)
32380 7E7C 4F         LD    C,A
32381 7E7D C5         PUSH  BC
32382 7E7E CDA47E     CALL  32420
32385 7E81 C1         POP   BC
32386 7E82 3A075B     LD    A,(23303)
32389 7E85 3C         INC   A
32390 7E86 32075B     LD    (23303),A
32393 7E89 0D         DEC   C
32394 7E8A 20F1       JR    NZ,7E7D
32396 7E8C 3A085B     LD    A,(23304)
32399 7E8F 3C         INC   A
32400 7E90 32085B     LD    (23304),A
32403 7E93 05         DEC   B
32404 7E94 20DD       JR    NZ,7E73
32406 7E96 3A065B     LD    A,(23302)
32409 7E99 C3307E     JP    32304
32412 7E9C 80         ADD   A,B
32413 7E9D 40         LD    B,B
32414 7E9E 2010       JR    NZ,7EB0
32416 7EA0 08         EX    AF,AF'
32417 7EA1 04         INC   B
32418 7EA2 02         LD    (BC),A
32419 7EA3 013A8E     LD    BC,36410
32422 7EA6 5C         LD    E,H
32423 7EA7 EEFF       XOR   255
32425 7EA9 47         LD    B,A
32426 7EAA 3A8D5C     LD    A,(23693)
32429 7EAD A0         AND   B
32430 7EAE 47         LD    B,A
32431 7EAF 3A085B     LD    A,(23304)
32434 7EB2 E6F8       AND   248
32436 7EB4 6F         LD    L,A
32437 7EB5 3A075B     LD    A,(23303)
32440 7EB8 FEC0       CP    192
32442 7EBA D0         RET   NC
32443 7EBB 1F         RRA
32444 7EBC 1F         RRA
32445 7EBD 1F         RRA
32446 7EBE E61F       AND   31
32448 7EC0 67         LD    H,A
32449 7EC1 CB1C       RR    H
32451 7EC3 CB1D       RR    L
32453 7EC5 CB1C       RR    H
32455 7EC7 CB1D       RR    L
32457 7EC9 CB1C       RR    H
32459 7ECB CB1D       RR    L
32461 7ECD 3E58       LD    A,88
32463 7ECF B4         OR    H
32464 7ED0 67         LD    H,A
32465 7ED1 3A8E5C     LD    A,(23694)
32468 7ED4 A6         AND   (HL)
32469 7ED5 B0         OR    B
32470 7ED6 77         LD    (HL),A
32471 7ED7 3A075B     LD    A,(23303)
32474 7EDA 47         LD    B,A
32475 7EDB E607       AND   7
32477 7EDD F640       OR    64
32479 7EDF 67         LD    H,A
32480 7EE0 78         LD    A,B
32481 7EE1 1F         RRA
32482 7EE2 1F         RRA
32483 7EE3 1F         RRA
32484 7EE4 E618       AND   24
32486 7EE6 B4         OR    H
32487 7EE7 67         LD    H,A
32488 7EE8 78         LD    A,B
32489 7EE9 17         RLA
32490 7EEA 17         RLA
32491 7EEB E6E0       AND   224
32493 7EED 6F         LD    L,A
32494 7EEE 3A085B     LD    A,(23304)
32497 7EF1 47         LD    B,A
32498 7EF2 1F         RRA
32499 7EF3 1F         RRA
32500 7EF4 1F         RRA
32501 7EF5 E61F       AND   31
32503 7EF7 B5         OR    L
32504 7EF8 6F         LD    L,A
32505 7EF9 EB         EX    DE,HL
32506 7EFA 219C7E     LD    HL,32412
32509 7EFD 78         LD    A,B
32510 7EFE E607       AND   7
32512 7F00 4F         LD    C,A
32513 7F01 0600       LD    B,0
32515 7F03 09         ADD   HL,BC
32516 7F04 46         LD    B,(HL)
32517 7F05 1A         LD    A,(DE)
32518 7F06 21065B     LD    HL,23302
32521 7F09 CB46       BIT   0,(HL)
32523 7F0B 2803       JR    Z,7F10
32525 7F0D B0         OR    B
32526 7F0E 12         LD    (DE),A
32527 7F0F C9         RET
```

```
32528 7F10 2F         CPL
32529 7F11 B0         OR    B
32530 7F12 2F         CPL
32531 7F13 12         LD    (DE),A
32532 7F14 C9         RET
```

```
32533 7F15 00        NOP
32534 7F16 00        NOP
32535 7F17 00        NOP
32536 7F18 00        NOP
32537 7F19 00        NOP
32538 7F1A 00        NOP
32539 7F1B 00        NOP
32540 7F1C 00        NOP
32541 7F1D 00        NOP
32542 7F1E 00        NOP
32543 7F1F 00        NOP
32544 7F20 00        NOP
32545 7F21 00        NOP
32546 7F22 00        NOP
32547 7F23 17        RLA
32548 7F24 DC0ACE    CALL C,52746
32551 7F27 0B        DEC  BC
32552 7F28 E7        RST  20
32553 7F29 50        LD   D,B
32554 7F2A 1A        LD   A,(DE)
32555 7F2B 17        RLA
```

Table B

Char	Address	Char	Address
space	15616	T	16032
0	15744	U	16040
1	15752	V	16048
2	15760	W	16056
3	15768	X	16064
4	15776	Y	16072
5	15784	Z	16080
6	15792	a	16136
7	15800	b	16144
8	15808	c	16152
9	15816	d	16160
A	15880	e	16168
B	15888	f	16176
C	15896	g	16184
D	15904	h	16192
E	15912	i	16200
F	15920	j	16208
G	15928	k	16216
H	15936	l	16224
I	15944	m	16232
J	15952	n	16240
K	15960	o	16248
L	15968	p	16256
M	15976	q	16264
N	15984	r	16272
O	15992	s	16280
P	16000	t	16288
Q	16008	u	16296
R	16016	v	16304
S	16024	w	16312
		x	16320
		y	16328
		z	16336

```
   1 REM Program 1
  10 LET w=4: LET t=4: LET a=7*w: LET d=168: LET a$="Demo": GO SUB 100: STOP : REM w max=8, min=32/48; d max=21, min=1
  15 REM try d=0!
 100 FOR n=1 TO LEN a$: FOR f=0 TO 7: LET p=PEEK (15360+CODE a$(n)*8+f)
 110 FOR i=0 TO 7: IF p-2*INT (p/2) THEN  FOR l=1 TO t: PLOT a-i*w,d-f*t-l: DRAW 1-w,0: NEXT l
 120 LET p=INT (p/2): NEXT i: NEXT f: LET a=a+w*8
 130 IF a>255 AND d-t*8>t*8-1 THEN  LET d=d-t*8: LET a=w*8-1
 140 IF a>255 AND d-t*8<t*8 THEN  PRINT AT 21,31': FOR f=1 TO t: PRINT : NEXT f: LET a=w*8-1
 150 NEXT n: RETURN
```

```
   1 REM Program 2
  10 INPUT "times wider? ";xs
  20 INPUT "times taller? ";ys
  30 LET yy=0
  40 LET p$="H"
  50 GO SUB 9998
  60 PAUSE 100
  70 RUN
9997 CLEAR 32255: LOAD ""CODE : RUN
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 3
  10 INPUT "Start address? ";s: CLEAR s-1: PRINT "LOAD Horizons Side B": LOAD "c"CODE s
  20 DEF FN a(x)=INT ((s+x)/256)
  30 DEF FN b(x)=s+x-256*FN a(x)
  40 RESTORE : FOR i=1 TO 5: READ y,x: POKE s+y,FN b(x): POKE s+1+y,FN a(x): NEXT i
  50 DATA 106,32,127,164,86,3,154,48,251,156
```

```
   1 REM Program 4
   5 FOR f=USR "a" TO USR "u" STEP 8: POKE f,255: POKE f+7,255: NEXT f
  10 LET p$="ABCDE": POKE 23606,216: POKE 23607,250
  20 LET yy=50: LET xs=2: LET ys=2: GO SUB 9998: POKE 23606,0: POKE 23607,60: STOP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 5
   5 RESTORE : FOR f=1 TO 6: READ a$,a: FOR n=0 TO 7: POKE USR a$+n,PEEK (a+n): POKE USR a$+n+8,0: NEXT n: NEXT f
   6 DATA "a",16024,"c",15896,"e",16016,"g",15992,"i",15968,"k",15968
  10 LET xs=2: LET ys=3: LET yy=50: LET p$="ACEGIK": FOR f=0 TO 8: POKE 23606,216+f: POKE 23607,250
  20 GO SUB 9998: NEXT f: POKE 2
```

```
3606,0: POKE 23607,60: STOP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 6
   5 RESTORE : FOR f=1 TO 6: READ a$,a,b$,b: FOR n=0 TO 7: POKE USR a$+n,PEEK (a+n): POKE USR b$+n,PEEK (b+n): NEXT n: NEXT f
   6 DATA "a",16024,"b",16032,"c",15896,"d",15944,"e",16016,"f",16032,"g",15992,"h",15968,"i",15968,"j",15912,"k",15968,"l",16024
  10 LET xs=2: LET ys=3: LET yy=50: LET p$="ACEGIK": FOR f=0 TO 8: POKE 23606,216+f: POKE 23607,250
  20 GO SUB 9998: NEXT f: POKE 23606,0: POKE 23607,60: STOP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 7
  10 LET yy=50: FOR f=2 TO 8 STEP 2: LET xs=f: LET ys=f: READ p$,I: INK I: LET yy=yy-8: GO SUB 9998: NEXT f: STOP : DATA "THIS",2," IS ",4,"YOUR",6,"LIFE",1
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 8
  10 LET p$="TITLE": FOR f=6 TO 1 STEP -1
  20 INK f-1: LET yy=100-f*10: LET xs=f: LET ys=f: GO SUB 9998: NEXT f: STOP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 9
  10 LET p$="RIPPLE": FOR f=5 TO 1 STEP -1
  20 INK f-1: LET yy=f*5-f: LET xs=f: LET ys=f: GO SUB 9998: NEXT f: STOP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 10
  10 LET p$="TITLE": FOR f=6 TO 1 STEP -1
  20 INK f-1: LET yy=100-f*4: LET xs=f: LET ys=f: GO SUB 9998: NEXT f: STOP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 11
  10 FOR f=1 TO 32: FOR n=1 TO 22: PRINT "P";: NEXT n: NEXT f
  20 LET yy=0: LET xs=32: LET ys=22: LET p$=" ": GO SUB 9998: STOP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 12"
  10 FOR f=1 TO 32: FOR n=1 TO 22: PRINT "P";: NEXT n: NEXT f
  20 LET yy=0: LET xs=1: LET ys=22: LET p$="
                          ": GO SUB 9998: STOP

9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POKE i+1,yy: POKE i+2,xs: POKE i+3,ys: POKE i+4,8: LET i=i+4: LET w=LEN p$: FOR n=1 TO w: POKE i+n,CODE p$(n): NEXT n: POKE i+w+1,255: LET w=USR 32256: RETURN
```

```
   1 REM Program 13
  10 FOR f=1 TO 32: FOR n=1 TO 22: PRINT "P";: NEXT n: NEXT f
```

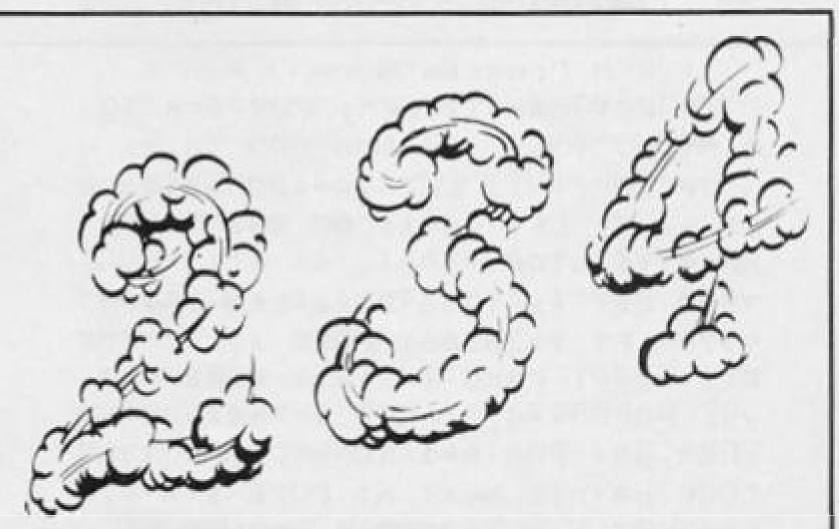
```
  20 LET yy=48: LET xs=16: LET y
s=8: LET p$=" ": GO SUB 9998: ST
OP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POK
E i+1,yy: POKE i+2,xs: POKE i+3,
ys: POKE i+4,8: LET i=i+4: LET w
=LEN p$: FOR n=1 TO w: POKE i+n,
CODE p$(n): NEXT n: POKE i+w+1,2
55: LET w=USR 32256: RETURN
```

```
   1 REM Program 14
  10 FOR f=1 TO 32: FOR n=1 TO 2
2: PRINT "P";: NEXT n: NEXT f
  20 LET xx=8: LET yy=16: LET xs
=8: LET ys=8: LET p$=" ": GO SUB
 9999: STOP
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POK
E i+1,yy: POKE i+2,xs: POKE i+3,
ys: POKE i+4,8: LET i=i+4: LET w
=LEN p$: FOR n=1 TO w: POKE i+n,
CODE p$(n): NEXT n: POKE i+w+1,2
55: LET w=USR 32256: RETURN
```

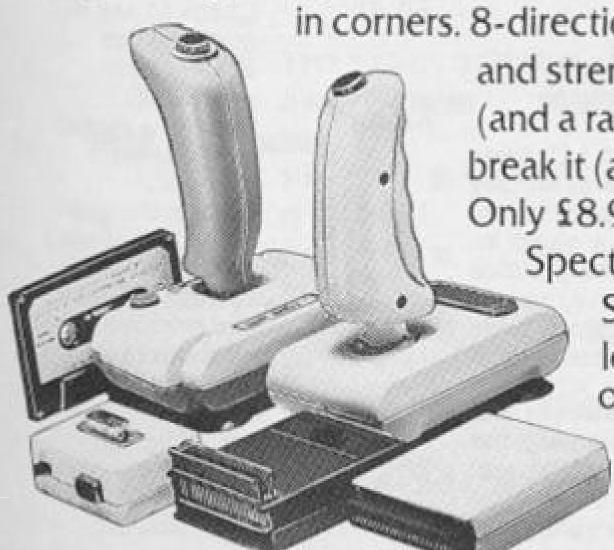


```
   1 REM Program 15
2000 LET a$="The quality of merc
y is not strained. It droppeth a
s the gentle rain from heaven up
on the place beneath. It is twic
e blest. It blesseth him that gi
ves, and him that takes."
2005 LET ys=1: LET yy=0: LET y=y
s*8: LET xs=1
2010 IF LEN a$<33 THEN  LET n=LE
N a$+1: LET b$=a$: GO TO 2050
2020 LET b$=a$( TO 32): IF a$(33
)=" " THEN  LET n=33: GO TO 2050
2030 FOR n=32 TO 1 STEP -1: IF b
$(n)=" " THEN  GO TO 2050
2040 NEXT n
2050 LET p$=b$( TO n-1): GO SUB
9998: IF a$="" THEN  STOP
2070 LET yy=yy+y: LET a$=a$(n+1
TO ): GO TO 2010
9998 LET xx=(256-8*xs*LEN p$)/2
9999 LET i=23306: POKE i,xx: POK
E i+1,yy: POKE i+2,xs: POKE i+3,
ys: POKE i+4,8: LET i=i+4: LET w
=LEN p$: FOR n=1 TO w: POKE i+n,
CODE p$(n): NEXT n: POKE i+w+1,2
55: LET w=USR 32256: RETURN
```

```
   1 REM Program 16
  10 PRINT AT 5,0;"______________
_____________________";AT 9,0;"___
________________________________"
  20 INPUT p$: IF LEN p$>16 THEN
 GO TO 20: GO SUB 9998
  30 LET yy=55: LET xs=2: LET ys
=2: LET xx=0: GO SUB 3100: LET y
y=160: GO SUB 3100
  40 COPY : STOP
9998 LET i=23306: POKE i,xx: POK
E i+1,yy: POKE i+2,xs: POKE i+3,
ys: POKE i+4,8: LET i=i+4: LET w
=LEN p$: FOR n=1 TO w: POKE i+n,
CODE p$(n): NEXT n: POKE i+w+1,2
55: LET w=USR 32256: RETURN
```







IQ test

Greg Turnbull, our regular adventure columnist, presents a program which will assess your ability to cope with those knotty problems!



This is a program for the 48K Spectrum. It contains a fifty question intelligence test and two short personality tests. The I.Q. test contains both verbal type questions, and mathematical ones. The maths questions can be worked out on paper (without the use of a calculator) and the results entered when prompted by the computer.

The listing may look very long, but don't be put off from typing it in, as many of the lines are very similar and can be edited out, altered and re-entered with a new line number.

The tests can be seen in an example screen before use. However, the main I.Q. test is timed (via a real time clock, which is updated periodically), so you have a maximum of thirty minutes to complete the test.

You may pass on any question by entering 0 to the answer(s). At the start of each loop you are requested to enter the number of the question you wish to attempt. This allows you to return to any questions you may have passed on. Note if you DO attempt a question, whether you get it right or not you will not be allowed to return to it later. You are only allowed one attempt at each question.

Take your time with the test and answer each question carefully, but don't spend too much time over a question you may be stuck on.

At the end of the test, if the time is up, or you request question 0, or if all of the questions have been tried, then your score, your I.Q. rating, and some comments will be printed on the screen. You can then try to answer questions in the personality tests. These questions have no time limit, and you only have to enter A or B in answer to them. Don't think too hard about the questions, try to answer them instinctively. At the end of each of these questions a comment is made based on your results.

The practice element

It must be noted that I.Q. tests cannot be regarded as totally reliable, and that the test can only be used once on a given individual because of the practice element. However, an examination of the listing should provide some very useful routines which you can incorporate into your own programs. For example: the named size/free variables; the message routines and the real time clock (based on the FRAMES system variable), and finally the auto-save/verify routine which saves time during the development of any program.

Program Notes

The following table gives description of the purpose and function of each line in the program.

2	POKE keyboard response time/sound. Define named variables for program size and free memory (in K).
3-9	Credits
11-17	Initialise screen picture (IQ. Test). Each line entered as a string. The whole picture is then defined as the sum of these (F$). String is then printed on the screen.
20-23	Load machine background noise.
25-30	Introduction to program. The message is stored as Y$, then string-splitting is used to sequentially print this on the screen + background machine code noise & beeps. The speed is changeable by altering PAUSE 3.
35-40	Menu of choices. Input and go to line number.
50-55	Continue subroutine.
60-65	Start test subroutine.
70-75	Choose question number subroutine.
80-86	Check to see if question has already been answered.
90-96	Prevent a repeat of the same question.
100-190	Update the real-time clock (based on the FRAMES system variable), and print the time on the screen (00.00 to 30.00 minutes/seconds).
200-250	Initialise variables eg IQ,SCORE, MIN, SEC etc...

300-360	Double number answer. (X,Y)
400-420	Single number answer (X)
500-520	Single word answer.
600-640	Personality test (P.TEST) no.1. Answer and score (A$,PT1 A)
650-690	Personality test (P.TEST) no.2. Answer and score (A$,PT2 B)
700-730	Load UDG. Graphic "A" = ""
800-815	P.TEST no.1 results/comments
900-915	P.TEST no.2 results/comments
1000-1140	I.Q. Test. Introductory message (Y$), as above. Start test, choose question number, update clock, check to see if question already answered, goto question line number (1000+(16 * Question number)) ie the main question loop.
1116-1910	The 50 I.Q. test questions. Print question, GOSUB for an answer, check to see if question was passed on (answer=0), remove question from screen, return to main loop (line 1040).
1950-1990	Time-up/test completed, GOSUB for results, return to menu.
2000-2310	P.TEST no.1. Set-up screen, and print intro message (Y$). Start test, print questions in sequence, check each answer, increase score. End test, GOSUB for result, print result/comments and return to menu.
3000-3540	P.TEST no.2. As per P.TEST no.1 except no message and there are 30 questions.
4000-4230	I.Q. test results. Get I.Q. value from score, print score, print I.Q. value and comments, return to menu.
5000-5130	I.Q. test examples.
9990-9999	Auto-save/verify routine: By GOTO 9900, and REM for program size: 34.6K

```
   1 REM I.Q. TEST.
   2 POKE 23609,250: POKE 23561,
6: POKE 23562,3: LET SIZE=(PEEK
23627+256*PEEK 23628-23755)/1000
: LET FREE=(65536-USR 7962)/1000
   3 REM
   4 REM ************************
   5 REM ***I.Q. TEST PROGRAM***
   6 REM **** By G.Turnbull.****
   7 REM **For 48K ZX Spectrum**
   8 REM ************************
   9 REM
  10 REM INITIAL SCREEN.
  11 LET A$=" ███   ████   ███
███ ███ ███  "
  12 LET B$="  █    █  █    █
█  █   █   "
  13 LET C$="  █    █  █    █
███ ███ █   "
  14 LET D$="  █    █ ██    █
█    █ █   "
  15 LET E$=" ███ █ ████ █  █
███ ███  █ █ "
  16 LET F$=A$+B$+C$+D$+E$
  17 BORDER 6: PAPER 6: INK 2: C
LS : PRINT AT 7,0;F$;AT 12,11;"█
█": BEEP .6,35: PAUSE 75
  20 REM LOAD M.C.
  21 CLEAR 65110: RESTORE : FOR
A=65110 TO 65128: READ B: POKE A
,B: NEXT A: READ C: LET C=C+6512
8: FOR A=65129 TO C: READ B: POK
E A,B: NEXT A
  22 DATA 62,9,237,71,237,94,201
,0,0,0,62,62,237,71,237,86,201,0
,0
  23 DATA 21,229,213,197,245,17,
16,0,33,16,0,205,181,03,241,193,
209,225,243,195,56,0
  25 REM INTRO.
  26 PAPER 4: BORDER 4: INK 0: C
LS : PRINT "INTELLIGENCE QUOTIEN
T (I.Q) TEST"; OVER 1;AT 0,0;"__
________________________________"'
'
  27 LET Y$=" THIS PROGRAM CONTA
INS ONE I.Q. TEST AND TWO PERSON
ALITY TESTS. THE TEST CONSISTS O
F 50 Q's,     AND HAS A TIME LIMI
T OF 30 MINS (BY A REAL TIME CLO
CK). IT MUST BE NOTED THAT I.Q T
ESTS CANNOT  BE REGARED AS TOTAL
LY ACCURATE.  THE TESTS ONLY SHO
W POTENTIAL  AND CAN ONLY BE USE
D ONCE.       INTELLIGENCE IS A
VERY VARIED  INDIVIDUAL FACTOR A
ND IS RELATEDTO A GENERAL LEVEL
OF ABILITY,  AS SHOWN IN THE PER
FORMANCE OF AWIDE RANGE OF DIFFE
RENT TASKS."
  28 RANDOMIZE USR 65110: FOR Z=
1 TO LEN Y$: IF Y$(Z)=" " THEN
PRINT " ";: GO TO 30
  29 PRINT Y$(Z);: BEEP .05,25:
PAUSE 3
  30 NEXT Z: RANDOMIZE USR 65120
: PAUSE 25: GO SUB 50
  35 REM TEST MENU.
  36 PAPER 0: INK 7: BORDER 0: B
RIGHT 1: CLS : PRINT "I.Q. TEST
MENU:"; OVER 1;AT 0,0;"__________
_____"''
  37 PRINT "PRESS 1 FOR I.Q. TES
T."''"2 FOR PERSONALITY TEST No.
1.","3 FOR PERSONALITY TEST No.2
.","4 FOR I.Q. TEST EXAMPLES."''
  38 INPUT "TEST No.";X: IF X=4
THEN  GO TO 5000
  39 IF X<1 OR X>4 THEN  GO TO 3
8
  40 GO TO X*1000
  50 REM CONT. ROUTINE.
  55 PRINT #0;"PRESS ANY KEY TO
CONTINUE:": PAUSE 0: PRINT #0: R
```

```
ETURN
  60 REM START ROUTINE.
  65 PRINT #0;"PRESS ANY KEY TO
START CLOCK:": PAUSE 0: PRINT #0
: RETURN
  70 REM Q. No. ROUTINE.
  75 INPUT "ENTER THE Q.No. YOU
WISH TO TRY:";B: IF B<0 OR B>50
THEN  GO TO 75
  76 IF B=0 THEN  GO TO 1955
  77 RETURN
  80 REM CHECK SCORE VALUE.
  85 IF S(B)=1 THEN  PRINT AT 2,
0; FLASH 1;"QUESTION ALREADY ANS
WERED!"; FLASH 0: GO TO 1040
  86 RETURN
  90 REM STOP REPEAT Q.
  91 LET BB=BB+1
  95 LET S(B)=1
  96 RETURN
 100 REM UPDATE CLOCK.
 110 DEF FN Z()=INT ((65536*PEEK
 23674+256*PEEK 23673+PEEK 23672
)/50): LET SEC2=FN Z(): LET SEC3
=SEC2-SEC1
 120 IF SEC3<60 THEN  LET SEC=SE
C3: GO TO 140
 130 LET MIN=INT SEC3/60: LET SE
C=(MIN-INT MIN)*60: LET MIN=INT
MIN: LET SEC=INT (SEC+.5)
 140 PRINT AT 0,0;"TIME=";AT 0,7
;"."
 150 IF MIN<=9 AND SEC<=9 THEN
PRINT AT 0,5;"0";MIN;AT 0,8;"0";
SEC
 160 IF MIN>9 AND SEC<=9 THEN  P
RINT AT 0,5;MIN;AT 0,8;"0";SEC
 170 IF MIN<=9 AND SEC>9 THEN  P
RINT AT 0,5;"0";MIN;AT 0,8;SEC
 180 IF MIN>9 AND SEC>9 THEN  PR
INT AT 0,5;MIN;AT 0,8;SEC
 190 RETURN
 200 REM INITIALISE.
 210 LET BB=0: DIM S(50): LET IQ
=0: LET W$="
              ": LET SCORE=0: LET
 MIN=0: LET SEC=0
 220 DEF FN Z()=INT ((65536*PEEK
 23674+256*PEEK 23673+PEEK 23672
)/50)
 230 GO SUB 60: REM START TEST.
 240 LET SEC1=FN Z()
 250 RETURN
 300 REM 2*NO. ANSWER.
 310 INPUT "ENTER No. OF 1st. IT
EM (X):";X
 320 IF X<0 OR X>6 THEN  GO TO 3
10
 330 INPUT "ENTER No. OF 2nd. IT
EM (Y):";Y
 340 IF Y<0 OR Y>6 THEN  GO TO 3
20
 350 IF X<>0 AND X=Y THEN  PRINT
 AT 2,0;"TRY AGAIN!": GO TO 1040
 360 RETURN
 400 REM SINGLE NO. ANSWER.
 410 INPUT "ENTER YOUR VALUE FOR
 A:";X
 420 RETURN
 500 REM ONE WORD ANSWER.
 510 INPUT "ENTER THE WORD/PART-
WORD ANSWER:";A$
 520 RETURN
 600 REM P.T.1 A. & SCORE.
 610 INPUT "ENTER ANSWER TO Q. (
A/B):";A$
 620 IF A$<>"a" AND A$<>"b" THEN
  GO TO 610
 630 IF A$="a" THEN  LET PT1A=PT
1A+1
 640 CLS : RETURN
 650 REM P.T.2 A. & SCORE.
 660 INPUT "ENTER ANSWER TO Q. (
A/B):";A$
 670 IF A$<>"a" AND A$<>"b" THEN
  GO TO 660
 680 IF A$="b" THEN  LET PT2B=PT
2B+1
 690 CLS : RETURN
 700 REM LOAD U.D.G.
 710 RESTORE 720: FOR B=0 TO 7:
READ C: POKE USR CHR$ 144+B,C: N
EXT B
 720 DATA 0,24,0,126,126,0,24,0
 730 RETURN
 800 REM P.TEST NO.1 RESULT.
 801 IF PT1A=20 THEN  PRINT "EXT
REMELY INTROVERTED!"
 802 IF PT1A=19 THEN  PRINT "VER
Y INTROVERTED"
 803 IF PT1A=18 THEN  PRINT "QUI
TE INTROVERTED"
 804 IF PT1A=17 OR PT1A=16 THEN
 PRINT "SOMEWHAT INTROVERTED"
 805 IF PT1A=15 OR PT1A=14 THEN
 PRINT "SLIGHTLY INTROVERTED"
 806 IF PT1A=13 OR PT1A=12 THEN
 PRINT "A SHADE INTROVERTED"
 807 IF PT1A=11 OR PT1A=10 OR PT
1A=9 THEN  PRINT "AVERAGE"
 808 IF PT1A=8 OR PT1A=7 THEN  P
RINT "A SHADE EXTROVERTED"
 809 IF PT1A=5 OR PT1A=6 THEN  P
RINT "SLIGHTLY EXTROVERTED"
 810 IF PT1A=3 OR PT1A=4 THEN  P
RINT "SOMEWHAT EXTROVERTED"
 811 IF PT1A=2 THEN  PRINT "QUIT
E EXTROVERTED"
```

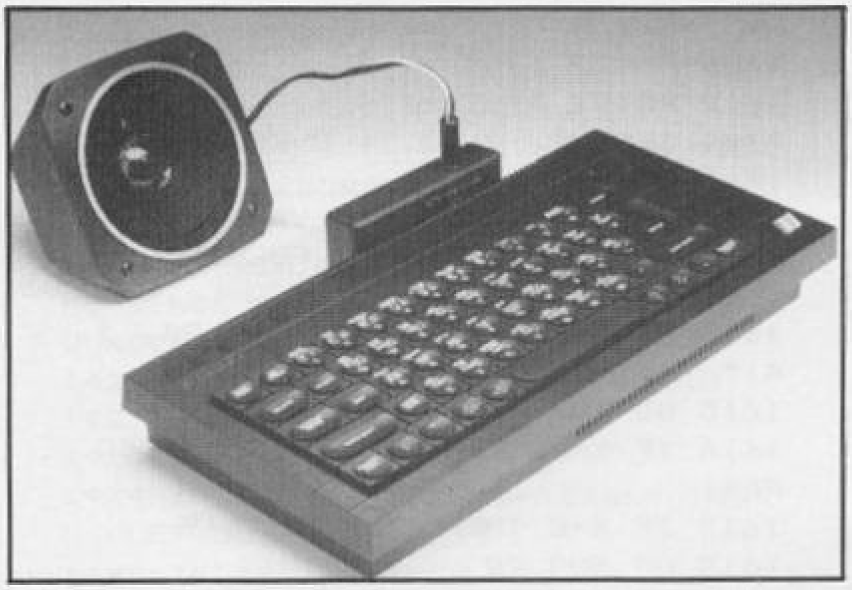
```
812 IF PT1A=1 THEN  PRINT "VERY
EXTROVERTED"
813 IF PT1A=0 THEN  PRINT "EXTR
EMELY EXTROVERTED!"
815 RETURN
900 REM P.TEST NO.2 RESULT.
901 IF PT2B=30 OR PT2B=29 THEN
PRINT "UNSHAKABLE!"
902 IF PT2B=28 OR PT2B=27 THEN
PRINT "IMPERTURBABLE"
903 IF PT2B=26 OR PT2B=25 THEN
PRINT "UNFLAPPABLE"
904 IF PT2B=24 OR PT2B=23 THEN
PRINT "CALM"
905 IF PT2B=22 OR PT2B=21 THEN
PRINT "BALANCED"
906 IF PT2B=20 OR PT2B=19 OR PT
2B=18 THEN  PRINT "STEADY"
907 IF PT2B=17 OR PT2B=16 OR PT
2B=15 OR PT2B=14 THEN  PRINT "AV
ERAGE"
908 IF PT2B=13 OR PT2B=12 OR PT
2B=11 THEN  PRINT "SYMPATHETIC"
909 IF PT2B=10 OR PT2B=9 THEN
PRINT "SUGGESTIBLE"
910 IF PT2B=8 OR PT2B=7 THEN  P
RINT "EMOTIONAL"
911 IF PT2B=6 OR PT2B=5 THEN  P
RINT "SENSITIVE"
912 IF PT2B=4 OR PT2B=3 THEN  P
RINT "OVERSENSITIVE"
913 IF PT2B=2 OR PT2B=1 THEN  P
RINT "NERVOUS"
914 IF PT2B=1 OR PT2B=0 THEN  P
RINT "NEUROTIC!"
915 RETURN
1000 REM I.Q. TEST.
1005 PAPER 6: BORDER 6: BRIGHT 0
: INK 2: CLS : GO SUB 700
1010 PRINT "I.Q.TEST.:"; OVER 1;
AT 0,0;"_________""
1015 LET Y$=" THIS IS A VERBAL/N
UMERICAL TYPEOF TEST. NO CALCULA
TORS ARE      ALLOWED. YOU HAVE 3
0 MINS. SO    USE THE TIME WELL,
DON'T GET     STUCK ON ANY ONE Q.
 TO PASS      ENTER 0 TO ANY ANSW
ER(S).        ONCE STARTED YOU M
UST ENTER THEQ. No. YOU WISH TO
TRY, THIS     ALLOWS YOU TO RETUR
N TO A PASSEDQ. IF YOU HAVE ANY
TIME LEFT.    ENTER 0 IF YOU ARE
 SURE YOU AREFINISHED BEFORE THE
 TIME IS UP. THE CLOCK IS UPDATE
D FOR EACH Q."
1016 RANDOMIZE USR 65110: FOR Z=
1 TO LEN Y$: IF Y$(Z)=" " THEN
PRINT " ";: GO TO 1018
1017 PRINT Y$(Z);: BEEP .05,25:
PAUSE 2
1018 NEXT Z: RANDOMIZE USR 65120
1020 GO SUB 50
1025 CLS : PRINT AT 0,16;"I.Q. T
EST:"; OVER 1;AT 0,16;"__________
"
1030 GO SUB 200: REM START.
1040 GO SUB 70: REM CHOOSE Q.
1045 IF BB=50 THEN  PRINT  FLASH
 1;AT 2,0;"ALL QUESTIONS ANSWERE
D!"; FLASH 0: PAUSE 50: GO TO 19
51
1050 GO SUB 100: REM GO CLOCK.
1055 IF MIN=30 THEN  GO TO 1950
1060 GO SUB 80: REM CHECK Q.
1065 GO TO 1100+(B*16): REM GO
QUESTION.
1100 REM I.Q TEST Q's.
1116 PRINT AT 2,0;"Q's. 1-6:ANAL
OGIES: Q.1."; OVER 1;AT 2,0;"___
_______________  ___";AT 4,0;"EN
TER THE No.s OF THE EXACT TWO WO
RDS NEEDED TO COMPLETE THESE:"
1117 PRINT AT 7,0;"SITTER IS TO
CHAIR AS X IS TO Y:"
1118 PRINT AT 9,0;"(CUP, SAUCER,
 PLATE, LEG)";AT 10,2;"1";TAB 8;
"2";TAB 16;"3";TAB 22;"4"
1119 GO SUB 300: REM ANSWER.
1120 IF X=1 AND Y=2 THEN  LET SC
ORE=SCORE+1
1121 IF X=0 AND Y=0 THEN  GO TO
1124: REM PASS.
1123 GO SUB 90: REM NO REPEAT Q.
1124 FOR A=2 TO 10: PRINT AT A,0
;W$: NEXT A
1125 GO TO 1040: REM RETURN.
1132 PRINT AT 2,0;"Q. No.2:"; OV
ER 1;AT 2,0;"________"
1133 PRINT AT 4,0;"NEEDLE IS TO
THREAD AS X IS TO Y"
1134 PRINT AT 6,0;"(COTTON, SEW,
 LEADER, FOLLOWER)";AT 7,3;"1";T
AB 10;"2";TAB 16;"3";TAB 26;"4"
1135 GO SUB 300
1136 IF X=3 AND Y=4 THEN  LET SC
ORE=SCORE+1
1137 IF X=0 AND Y=0 THEN  GO TO
1139
1138 GO SUB 90
1139 FOR A=2 TO 7: PRINT AT A,0;
W$: NEXT A
1140 GO TO 1040
1148 PRINT AT 2,0;"Q. No.3:"; OV
ER 1;AT 2,0;"________"
1149 PRINT AT 4,0;"BETTER IS TO
WORSE AS X IS TO Y:"
1150 PRINT AT 6,0;"(REJOICE, CHO
```

```
ICE, BAD, MOURN)";AT 7,4;"1";TAB
 12;"2";TAB 19;"3";TAB 25;"4"
1151 GO SUB 300
1152 IF X=1 AND Y=4 THEN  LET SC
ORE=SCORE+1
1153 IF X=0 AND Y=0 THEN  GO TO
1155
1154 GO SUB 90
1155 FOR A=2 TO 7: PRINT AT A,0;
W$: NEXT A
1156 GO TO 1040
1164 PRINT AT 2,0;"Q. No.4:"; OV
ER 1;AT 2,0;"_______"
1165 PRINT AT 4,0;"FLOOR IS TO S
UPPORT AS X IS TO Y"
1166 PRINT AT 6,0;"(WINDOW, GLAS
S, VIEW, BRICK)";AT 7,3;"1";TAB
11;"2";TAB 17;"3";TAB 24;"4"
1167 GO SUB 300
1168 IF X=1 AND Y=3 THEN  LET SC
ORE=SCORE+1
1169 IF X=0 AND Y=0 THEN  GO TO
1171
1170 GO SUB 90
1171 FOR A=2 TO 7: PRINT AT A,0;
W$: NEXT A
1172 GO TO 1040
1180 PRINT AT 2,0;"Q. No.5:"; OV
ER 1;AT 2,0;"_______"
1181 PRINT AT 4,0;"ISLAND IS TO
WATER AS X IS TO Y:"
1182 PRINT AT 6,0;"(WITHOUT, CEN
TRE, DIAGONAL,";AT 8,0;"PERIMETE
R)";AT 7,4;"1";TAB 12;"2";TAB 21
;"3";AT 9,4;"4"
1183 GO SUB 300
1184 IF X=2 AND Y=4 THEN  LET SC
ORE=SCORE+1
1185 IF X=0 AND Y=0 THEN  GO TO
1187
1186 GO SUB 90
1187 FOR A=2 TO 9: PRINT AT A,0;
W$: NEXT A
1188 GO TO 1040
1196 PRINT AT 2,0;"Q. No.6:"; OV
ER 1;AT 2,0;"_______"
1197 PRINT AT 4,0;"VEIL IS TO CU
RTAIN AS X IS TO Y:"
1198 PRINT AT 6,0;"(EYES, SEE, W
INDOW, HEAR)";AT 7,2;"1";TAB 8;"
2";TAB 14;"3";TAB 21;"4"
1199 GO SUB 300
1200 IF X=1 AND Y=3 THEN  LET SC
ORE=SCORE+1
1201 IF X=0 AND Y=0 THEN  GO TO
1203
1202 GO SUB 90
1203 FOR A=2 TO 7: PRINT AT A,0;
W$: NEXT A
1204 GO TO 1040
1212 PRINT AT 2,0;"Q's. 7-12:SIM
ILARITIES: Q.7."; OVER 1;AT 2,0;
"___________________________";AT
 4,0;"ENTER THE No.s OF TWO WORD
S WITHTHE MOST SIMILAR MEANINGS.
"
1213 PRINT AT 7,0;"DIVULGE, DIVE
R, REVEAL, REVERT";AT 8,3;"1";TA
B 11;"2";TAB 18;"3";TAB 26;"4"
1215 GO SUB 300
1216 IF X=1 OR X=3 AND Y=1 OR Y=
3 THEN  LET SCORE=SCORE+1
1217 IF X=0 AND Y=0 THEN  GO TO
1219
1218 GO SUB 90
1219 FOR A=2 TO 8: PRINT AT A,0;
W$: NEXT A
1220 GO TO 1040
1228 PRINT AT 2,0;"Q. No.8:"; OV
ER 1;AT 2,0;"_______"
1229 PRINT AT 4,0;"BLESSING, BLE
SS, BENEDICTION,";AT 6,0;"BLESSE
D";AT 5,3;"1";TAB 12;"2";TAB 21;
"3";AT 7,3;"4"
1231 GO SUB 300
1232 IF X=1 OR X=3 AND Y=1 OR Y=
3 THEN  LET SCORE=SCORE+1
1233 IF X=0 AND Y=0 THEN  GO TO
1235
1234 GO SUB 90
1235 FOR A=2 TO 7: PRINT AT A,0;
W$: NEXT A
1236 GO TO 1040
1244 PRINT AT 2,0;"Q. No.9:"; OV
ER 1;AT 2,0;"_______"
1245 PRINT AT 4,0;"INTELLIGENCE,
 SPEEDINESS,";AT 6,0;"CURRENTS,
TIDINGS";AT 5,5;"1";TAB 18;"2";A
T 7,3;"3";TAB 13;"4"
1247 GO SUB 300
1248 IF X=1 OR X=4 AND Y=1 OR Y=
4 THEN  LET SCORE=SCORE+1
1249 IF X=0 AND Y=0 THEN  GO TO
1251
1250 GO SUB 90
1251 FOR A=2 TO 7: PRINT AT A,0;
W$: NEXT A
1252 GO TO 1040
1260 PRINT AT 2,0;"Q. No.10:"; O
VER 1;AT 2,0;"________"
1261 PRINT AT 4,0;"TALE, NOVEL,
VOLUME, STORY";AT 5,1;"1";TAB 8;
"2";TAB 15;"3";TAB 23;"4"
1263 GO SUB 300
1264 IF X=1 OR X=4 AND Y=1 OR Y=
4 THEN  LET SCORE=SCORE+1
1265 IF X=0 AND Y=0 THEN  GO TO
1267
```

```
1266 GO SUB 90
1267 FOR A=2 TO 5: PRINT AT A,Ø;
W$: NEXT A
1268 GO TO 1040
1276 PRINT AT 2,Ø;"Q. No.11:"; O
VER 1;AT 2,Ø;"_________"
1277 PRINT AT 4,Ø;"INCARCERATE,
PUNISH, CANE,";AT 6,Ø;"CHASTISE"
;AT 5,5;"1";TAB 15;"2";TAB 22;"3
";AT 7,4;"4"
1279 GO SUB 300
1280 IF X=2 OR X=4 AND Y=2 OR Y=
4 THEN  LET SCORE=SCORE+1
1281 IF X=Ø AND Y=Ø THEN  GO TO
1283
1282 GO SUB 90
1283 FOR A=2 TO 7: PRINT AT A,Ø;
W$: NEXT A
1284 GO TO 1040
1292 PRINT AT 2,Ø;"Q. No.12:"; O
VER 1;AT 2,Ø;"_________"
1293 PRINT AT 4,Ø;"LUMP, WOOD, R
AY, BEAM";AT 5,1;"1";TAB 7;"2";T
AB 13;"3";TAB 18;"4"
1295 GO SUB 300
1296 IF X=3 OR X=4 AND Y=3 OR Y=
4 THEN  LET SCORE=SCORE+1
1297 IF X=Ø AND Y=Ø THEN  GO TO
1299
1298 GO SUB 90
1299 FOR A=2 TO 5: PRINT AT A,Ø;
W$: NEXT A
1300 GO TO 1040
1308 PRINT AT 2,Ø;"Q's.13-19:MAT
HS EQUATIONS. Q.13."; OVER 1;AT
2,Ø;"_______________________
____";AT 4,Ø;"WORK OUT THE VALUE
 OF A IN THESEEQUATIONS, ON PAPE
R AND THEN    ENTER IT WHEN PROM
PTED."
1309 PRINT AT 8,Ø;" 42=A*(A+1)"
1311 GO SUB 400
1312 IF X=6 THEN  LET SCORE=SCOR
E+1
1313 IF X=Ø THEN  GO TO 1315
1314 GO SUB 90
1315 FOR A=2 TO 8: PRINT AT A,Ø;
W$: NEXT A
1316 GO TO 1040
1324 PRINT AT 2,Ø;"Q. No.14:"; O
VER 1;AT 2,Ø;"_________"
1325 PRINT AT 4,Ø;" 8*7=2*A+A+2"
1327 GO SUB 400
1328 IF X=18 THEN  LET SCORE=SCO
RE+1
1329 IF X=Ø THEN  GO TO 1331
1330 GO SUB 90
1331 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
1332 GO TO 1040
1340 PRINT AT 2,Ø;"Q. No.15:"; O
VER 1;AT 2,Ø;"_________"
1341 PRINT AT 4,Ø;" 2+(9*6)=14*A
"
1343 GO SUB 400
1344 IF X=4 THEN  LET SCORE=SCOR
E+1
1345 IF X=Ø THEN  GO TO 1347
1346 GO SUB 90
1347 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
1348 GO TO 1040
1356 PRINT AT 2,Ø;"Q. No.16:"; O
VER 1;AT 2,Ø;"_________"
1357 PRINT AT 4,Ø;" 12+8-21=16+A
"
1359 GO SUB 400
1360 IF X=-17 THEN  LET SCORE=SC
ORE+1
1361 IF X=Ø THEN  GO TO 1363
1362 GO SUB 90
1363 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
1364 GO TO 1040
1372 PRINT AT 2,Ø;"Q. No.17:"; O
VER 1;AT 2,Ø;"_________"
1373 PRINT AT 4,Ø;" 5*9=15*A"
1375 GO SUB 400
1376 IF X=3 THEN  LET SCORE=SCOR
E+1
1377 IF X=Ø THEN  GO TO 1379
1378 GO SUB 90
1379 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
1380 GO TO 1040
1388 PRINT AT 2,Ø;"Q. No.18:"; O
VER 1;AT 2,Ø;"_________"
1389 PRINT AT 4,Ø;" Ø.21÷Ø.25=Ø.
6*Ø.7*A"
1391 GO SUB 400
1392 IF X=2 THEN  LET SCORE=SCOR
E+1
1393 IF X=Ø THEN  GO TO 1395
1394 GO SUB 90
1395 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
1396 GO TO 1040
1404 PRINT AT 2,Ø;"Q. No.19:"; O
VER 1;AT 2,Ø;"_________"
1405 PRINT AT 4,Ø;" Ø.28÷Ø.35=Ø.
5*Ø.4*A"
1407 GO SUB 400
1408 IF X=4 THEN  LET SCORE=SCOR
E+1
1409 IF X=Ø THEN  GO TO 1411
1410 GO SUB 90
1411 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
```

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1412 GO TO 1040
1420 PRINT AT 2,0;"Q's.20-25: LI
NKS. Q.20."; OVER 1;AT 2,0;"____
___________ ____";AT 4,0;"ENTE
R THE FULL WORD OR THE       MISS
ING PART OF THE WORD IN THE BRAC
KETS, WHICH MEANS THE SAME  IN O
NE SENSE AS BOTH OF THE      SURR
OUNDING WORDS."
1421 PRINT AT 10,0;"WHIP (L**H)
TIE"
1423 GO SUB 500
1424 IF A$="as" OR A$="lash" THE
N LET SCORE=SCORE+1
1425 IF A$="0" THEN  GO TO 1427
1426 GO SUB 90
1427 FOR A=2 TO 10: PRINT AT A,0
;W$: NEXT A
1428 GO TO 1040
1436 PRINT AT 2,0;"Q. No. 21:";
OVER 1;AT 2,0;"_________"
1437 PRINT AT 4,0;"DASH (D**T) M
ISSILE"
1439 GO SUB 500
1440 IF A$="ar" OR A$="dart" THE
N LET SCORE=SCORE+1
1441 IF A$="0" THEN  GO TO 1443
1442 GO SUB 90
1443 FOR A=2 TO 4: PRINT AT A,0;
W$: NEXT A
1444 GO TO 1040
1452 PRINT AT 2,0;"Q. No. 22:";
OVER 1;AT 2,0;"_________"
1453 PRINT AT 4,0;"MOULD (F**M)
CLASS"
1455 GO SUB 500
1456 IF A$="or" OR A$="form" THE
N LET SCORE=SCORE+1
1457 IF A$="0" THEN  GO TO 1459
1458 GO SUB 90
1459 FOR A=2 TO 4: PRINT AT A,0;
W$: NEXT A
1460 GO TO 1040
1468 PRINT AT 2,0;"Q. No. 23:";
OVER 1;AT 2,0;"_________"
1469 PRINT AT 4,0;"SQUASH (P***S
) CROWD"
1471 GO SUB 500
1472 IF A$="res" OR A$="press" T
HEN  LET SCORE=SCORE+1
1473 IF A$="0" THEN  GO TO 1475
1474 GO SUB 90
1475 FOR A=2 TO 4: PRINT AT A,0;
W$: NEXT A
1476 GO TO 1040
1484 PRINT AT 2,0;"Q. No. 24:";
OVER 1;AT 2,0;"_________"
1485 PRINT AT 4,0;"THIN (F**E) G
OOD"
1486 GO SUB 500
1488 IF A$="in" OR A$="fine" THE
N  LET SCORE=SCORE+1
1489 IF A$="0" THEN  GO TO 1491
1490 GO SUB 90
1491 FOR A=2 TO 4: PRINT AT A,0;
W$: NEXT A
1492 GO TO 1040
1500 PRINT AT 2,0;"Q. No. 25:";
OVER 1;AT 2,0;"_________"
1501 PRINT AT 4,0;"IGNITE (F**E)
 SHOOT"
1503 GO SUB 500
1504 IF A$="ir" OR A$="fire" THE
N  LET SCORE=SCORE+1
1505 IF A$="0" THEN  GO TO 1507
1506 GO SUB 90
1507 FOR A=2 TO 4: PRINT AT A,0;
W$: NEXT A
1508 GO TO 1040
1516 PRINT AT 2,0;"Q's. 26-31: O
PPOSITES: Q.26."; OVER 1;AT 2,0;
"_______________________ ____";AT
 4,0;"ENTER THE No.s OF TWO WORD
S WITHALMOST OPPOSITE MEANINGS."
1517 PRINT AT 7,0;"HEAVY, LARGE,
 LIGHT, BIG, WEIGHT";AT 8,2;"1";
TAB 9;"2";TAB 16;"3";TAB 22;"4";
TAB 29;"5"
1519 GO SUB 300
1520 IF X=1 OR X=3 AND Y=1 OR Y=
3 THEN  LET SCORE=SCORE+1
1521 IF X=0 AND Y=0 THEN  GO TO
1523
1522 GO SUB 90
1523 FOR A=2 TO 8: PRINT AT A,0;
W$: NEXT A
1524 GO TO 1040
1532 PRINT AT 2,0;"Q. No. 27:";
OVER 1;AT 2,0;"_________"
1533 PRINT AT 4,0;"INSULT, DENY,
 DENIGRATE, FIRM,";AT 6,0;"AFFIR
M"
1534 PRINT AT 5,2;"1";TAB 9;"2";
TAB 18;"3";TAB 26;"4";AT 7,2;"5"
1535 GO SUB 300
1536 IF X=2 OR X=5 AND Y=2 OR Y=
5 THEN  LET SCORE=SCORE+1
1537 IF X=0 AND Y=0 THEN  GO TO
1539
1538 GO SUB 90
1539 FOR A=2 TO 7: PRINT AT A,0;
W$: NEXT A
1540 GO TO 1040
1548 PRINT AT 2,0;"Q. No. 28:";
OVER 1;AT 2,0;"_________"
1549 PRINT AT 4,0;"MISSED, VEIL,
 CONFUSE, SECRET,";AT 6,0;"EXPOS
E"
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1550 PRINT AT 5,2;"1";TAB 9;"2";
TAB 17;"3";TAB 25;"4";AT 7,2;"5"
1551 GO SUB 300
1552 IF X=2 OR X=5 AND Y=2 OR Y=
5 THEN  LET SCORE=SCORE+1
1553 IF X=Ø AND Y=Ø THEN  GO TO
1555
1554 GO SUB 9Ø
1555 FOR A=2 TO 7: PRINT AT A,Ø;
W$: NEXT A
1556 GO TO 1Ø4Ø
1564 PRINT AT 2,Ø;"Q. No. 29:";
OVER 1;AT 2,Ø;"__________"
1565 PRINT AT 4,Ø;"FRANK, OVERT,
 PLAIN, SIMPLE,";AT 6,Ø;"SECRETI
VE"
1566 PRINT AT 5,2;"1";TAB 9;"2";
TAB 16;"3";TAB 24;"4";AT 7,3;"5"
1567 GO SUB 3ØØ
1568 IF X=1 OR X=5 AND Y=1 OR Y=
5 THEN  LET SCORE=SCORE+1
1569 IF X=Ø AND Y=Ø THEN  GO TO
1571
157Ø GO SUB 9Ø
1571 FOR A=2 TO 7: PRINT AT A,Ø;
W$: NEXT A
1572 GO TO 1Ø4Ø
158Ø PRINT AT 2,Ø;"Q. No. 3Ø:";
OVER 1;AT 2,Ø;"__________"
1581 PRINT AT 4,Ø;"AGGRAVATE, PL
EASE, ENJOY,";AT 6,Ø;"IMPROVE, L
IKE"
1582 PRINT AT 5,3;"1";TAB 14;"2"
;TAB 21;"3";AT 7,3;"4";TAB 1Ø;"5
"
1583 GO SUB 3ØØ
1584 IF X=1 OR X=4 AND Y=1 OR Y=
4 THEN  LET SCORE=SCORE+1
1585 IF X=Ø AND Y=Ø THEN  GO TO
1587
1586 GO SUB 9Ø
1587 FOR A=2 TO 7: PRINT AT A,Ø;
W$: NEXT A
1588 GO TO 1Ø4Ø
1596 PRINT AT 2,Ø;"Q. No. 31:";
OVER 1;AT 2,Ø;"__________"
1597 PRINT AT 4,Ø;"ANTEDATE, PRI
MITIVE, PRIMORDIAL";AT 6,Ø;"PRIM
ATE, ULTIMATE"
1598 PRINT AT 5,3;"1";TAB 13;"2"
;TAB 25;"3";AT 7,3;"4";TAB 13;"5
"
1599 GO SUB 3ØØ
16ØØ IF X=3 OR X=5 AND Y=3 OR Y=
5 THEN  LET SCORE=SCORE+1
16Ø1 IF X=Ø AND Y=Ø THEN  GO TO
16Ø3
16Ø2 GO SUB 9Ø
16Ø3 FOR A=2 TO 7: PRINT AT A,Ø;
W$: NEXT A
16Ø4 GO TO 1Ø4Ø
1612 PRINT AT 2,Ø;"Q's. 32-36: M
ATHS SERIES: Q.32."; OVER 1;AT 2
,Ø;"__________________________ __
__";AT 4,Ø;"ENTER THE VALUE OF T
HE NO. WHICHLOGICALLY FOLLOWS TH
E OTHERS."
1613 PRINT AT 7,Ø;" 3,6,12,24, (
A)"
1615 GO SUB 4ØØ
1616 IF X=48 THEN  LET SCORE=SCO
RE+1
1617 IF X=Ø THEN  GO TO 1619
1618 GO SUB 9Ø
1619 FOR A=2 TO 7: PRINT AT A,Ø;
W$: NEXT A
162Ø GO TO 1Ø4Ø
1628 PRINT AT 2,Ø;"Q. No. 33:";
OVER 1;AT 2,Ø;"__________"
1629 PRINT AT 4,Ø;" 81,54,36,24
(A)"
1631 GO SUB 4ØØ
1632 IF X=16 THEN  LET SCORE=SCO
RE+1
1633 IF X=Ø THEN  GO TO 1635
1634 GO SUB 9Ø
1635 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
1636 GO TO 1Ø4Ø
1644 PRINT AT 2,Ø;"Q. No. 34:";
OVER 1;AT 2,Ø;"__________"
1645 PRINT AT 4,Ø;" 2,3,5,9,17 (
A)"
1647 GO SUB 4ØØ
1648 IF X=33 THEN  LET SCORE=SCO
RE+1
1649 IF X=Ø THEN  GO TO 1651
165Ø GO SUB 9Ø
1651 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
1652 GO TO 1Ø4Ø
166Ø PRINT AT 2,Ø;"Q. No. 35:";
OVER 1;AT 2,Ø;"__________"
1661 PRINT AT 4,Ø;" 7,13,19,25 (
A)"
1663 GO SUB 4ØØ
1664 IF X=31 THEN  LET SCORE=SCO
RE+1
1665 IF X=Ø THEN  GO TO 1667
1666 GO SUB 9Ø
1667 FOR A=2 TO 4: PRINT AT A,Ø;
W$: NEXT A
1668 GO TO 1Ø4Ø
1676 PRINT AT 2,Ø;"Q. No. 36:";
OVER 1;AT 2,Ø;"__________"
1677 PRINT AT 4,Ø;" 9,16,25,36 (
A)"
1679 GO SUB 4ØØ
```



DK's Speak Easy

"Well boss, whatssall dis 'bouta new speakeasy?"
Nothing to worry above, Daps, 'snothin to do with moonshine."

Actually it is the latest of a whole bunch of units produced by DK'Tronics all of which look very similar, and that must keep design and production costs down!

Could you tell the difference between the Beep Booster and the 3 Channel Sound Synth? No? Well now you have the Speech Synthesizer to add to the confusion. Consisting of the same speaker pod and interface case as the other units, into which it plugs, the electronics this time produce speech!

"So what", you say, "there's several around already". But DK assure me that the system has several advantages over the existing units, for instance, there is a word recognition system built in which makes using it very simple. Just enter speech in its normal english form!

And that's not all, based on the SLO/256 chip it lets the computer get on with whatever else it should be doing while the words are being verbalised.

"Sounds good, what else can you tell me".

Nothing as yet, except it costs £24.95 and I hope to do a full review very soon.

IN . . . . BRIEF

● For those who own a standard Spectrum in its original keyboard and who want a cheap but effective joystick could be interested in the clip-on mechanical joystick from E.E.C.

Guaranteed unbreakable it costs £9.95 and is available from EEC. Ltd., 1 Whitehouse Close, Chalfont St. Peter, Bucks, SL9 0DA.

● Thurnell tell me that their latest Disk drive system is proving to be a great success. Using Hitachi 3" double sided drives, it uses absolutely none of the Spectrum's memory. Software is being prepared to facilitate tape to disk transfer.

It will cost you £219.95 from Thurnell Electronics, 95 Liverpool Rd. Cadishead, Manchester.

● USA TS2068 users who want to run Spectrum software can do so by fitting the ROMSWITCH from G Russell electronics, RD1, BOX 539, Centre Hall, PA 16828 for $54.95

RD Digital Tracer Traced

This device which we reviewed favourably in a previous issue was saved from extinction by the take over of RD Laboratories by Kane-May Ltd. David Jeffcock, the managing director, expressed his faith in the unit in the face of increasing interest in the creative and educational usage of computers. Used in conjunction with the Microdrive, transferring the software to this medium is a very easy operation, the ability to use the computer to create fast and accurate diagrams, charts or pictures extends the scope of the Spectrums viable usage.

Two versions are available for different size master paper, A4 and A3 and cost £75 and £60 or thereabouts.



QL News

QCOM is a set of communications modules for the Sinclair QL, manufactured by OE Ltd, North Point, Gilwilly Ind. Est., Penrith, Cumbria CA11 9BN.

QCON is the essential controller, and QMOD allows direct connection to the telephone line. Each of these costs £75.95 QCALL is optional and adds auto dial and auto answer facilities to QMOD. It costs £49.95.

● Prism, well known for their Spectrum peripherals, have produced a nice looking and reasonably priced Monitor for use with the QL. All black, the 14" colour monitor costs £199.99 and displays the full 85 columns. A connecting cable is supplied as well as a detachable anti-glare tinted glass front.

● Another monitor specifically for the QL is made by MBS Data Efficiency Ltd. This one is recommended by Sinclair Research. However it has a 12" screen and costs £299.00.

● An interesting mobile plotter from Penman Products, 8 Hazelwood Close, Dominion Way, Worthing, W. Sussex, BN14 8NP will connect to any RS232 socket to provide desk top plotting and turtle actions. Cost is £249.00.

● The QL, after a slow start, seems to be taking off at last. Some of the hardware now available makes it an attractive machine for buyers. The first spate of books has now been followed by a veritable flood and no doubt we'll soon see a boom in software. Quest has produced the QL Executive Series of peripherals and programs to boost the capabilities of the QL. these include CP/M6-4K either on 5.25" at £49.95 or on microdrive cartridge at £79.50.

Disk drive units are available from 200K (£249.00) to 7.5M-bytes on winchester hard disk at £995.00 RAM memory expansion boards from 64K to 512K can be supplied, and a console to house all of it. Business software includes Tally I and II which form a comprehensive ledger and stock control package.



QUICKSOFT

Clive Smith, our tame "Jack of all tapes" looks at some more unusual, interesting and specialised programs.

MASTERMIND by Mirrorsoft

A few issues ago I reviewed **Blockbusters**. Well, here is Mastermind, another quiz game taken from a television program.

The complete game comes in two separate parts. The first part is a twin cassette pack which contains the program on one tape and the data or questions on the other. This package can be bought separately and played without the use of the other cassette, which I will come to later. From the twin pack you first load the program tape and you'll soon come to realise, that it's just like the Mastermind on the box.

Once this tape is loaded, you are asked how many contestants wish to play. You can have up to four players. Then, the first contestant is called and you are asked to enter your name, occupation, and specialist subject. This is where the second tape comes in. The second tape holds questions about films on one side of the tape and sport on the other. Each set of specialised questions is followed by general knowledge questions. Of course, you can only answer the questions that are on the data tape. So when asked to enter your subject, you then load the appropriate questions. There are about 100 questions per subject, so if four persons are playing you get 25 different questions each. As you are playing against the clock it would be rare to answer all 25. When the data is loaded you are given 2 minutes to answer the questions. You also have the ability to 'pass' by hitting the enter key and are told the correct answer at the end of your go.

One of the features I like was the computer's ability to recognise key words in your answers. If, for example, you answered Shakespeare, and the correct answer was William Shakespeare, it would in fact give you the point, and the words, "I can accept that" appear on the screen. If the second contestant wants to answer questions on a different subject then you will have a load separate data each time. The loading of data takes about three minutes. If four are playing and you all have different subjects it tends to take the fun out of the game as you are forever loading data. A microdrive version of the game is not planned, but if there's enough demand. . . . who knows.

After the first round you then load the general knowledge questions and answer in the same way. Scores are shown after the first round and a hard copy can be made if needed. Now, back to the other package I mentioned. This is called **Mastermind Quizmaster** and is made to be used in conjunction with the Mastermind game. This is a single cassette which enables you to write your own questions. Once loaded, this is easy to do using the menu-driven system. You can also use keywords, as in the pre-recorded tapes. I'd just like to mention that although it follows the TV version very closely it does not come with a leather chair.

The Mastermind twin pack will cost you £9.95 and the Mastermind Quizmaster will set you back £5.95. Both are written for the 48K Spectrum.



COPPER HOPPER by ESP

A nice little arcade game written for the 48K Spectrum, Copper Hopper is a little on the lines of Manic Miner but with four levels. You are Ron the Con who has been put in jail, and the object is to escape. This is done by collecting keys before the copper can catch you. On screen there are four floor levels which can be reached by a series of ladders. Along each floor is a series of holes which you can fall through, and hanging on the ceiling are the keys which you have to jump up and catch. You can only jump to the right and ascend the ladders. The coppers are constantly walking along the various floors to get you, though it is possible to jump over the top of them.

As well as being able to jump to avoid the coppers, there are sausages (I thought it odd too) hanging up, and if you jump and reach one, all of the coppers will disappear for a short while.

You have the choice of using keyboard contol or a Kempston joystick. Cost is just £2.99, as the game is part of ESP's budget range.

WORLD GLOBE & STARGAZER by Eclipse Software

Just two of a series of tapes from Eclipse, who seem to have



bent towards the planets and stars. The first of these tapes is **World Globe**. Written in machine code for the 48K Spectrum it draws the world globe in hi-res graphics as seen from outer space and gives you the ability to rotate it. It also holds a list of 240 locations such as cities, rivers and other important features such as oceans, monuments etc. After choosing one of these features the computer then draws the globe in one and a half seconds and a flashing cursor will pinpoint it. By choosing a co-ordinate (longitude and latitude) you can also pinpoint anywhere on the globe.

The second tape is **Stargazer** which looks the other way towards the heavens. A fairly comprehensive program which plots 34 constellations containing over 340 stars. It will also tell you what phase and position the moon will be in at any hour between the years 1950 and 2000. There is also a quiz and learning program to help you. The program holds a large database containing facts about the stars such as colour, size and distance from the Earth.

If you are a budding astronomer I think you will find this a very useful tape to have. Eclipse produce a range of tapes such as Meteor Shows, Planetarium, Halleys Comet, Messier List, and The Cosmos.

The two tapes I looked at will cost you £6.95 each and all tapes from Eclipse are written for the 48K Spectrum.

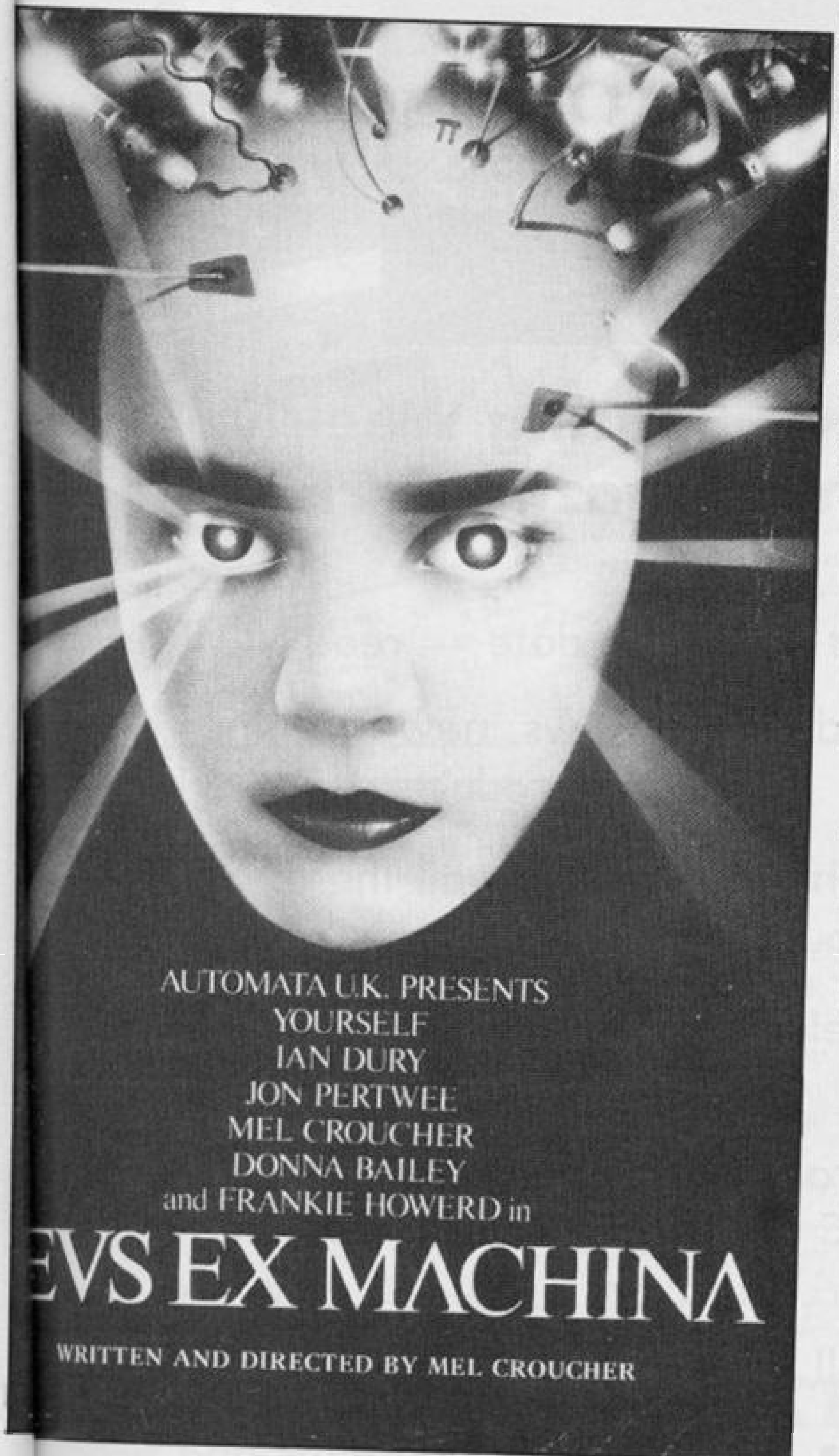
Deus ex machina by Automata UK

Are you fed up with the endless stream of arcade games and the like, and would like to try something different?

If so, then here is something new, a completely new concept. Not so much a game, more an experience. **Deus Ex Machina**, which means 'a God out of the machine' comes on two tapes, one is the program and the other is the soundtrack. First, load the program, then insert the audio tape. Switch off all the lights, put on a good set of stereo headphones and turn up the volume. Now prepare yourself for an experience.

To start, the two tapes have to be synchronized. This is done by using a countdown from the screen to tell you when to start your audio tape. The program will stop and you will be told by Jon Pertwee, who reads the narrative, exactly when to hit a key to re-start the program. To give you some idea what to expect here is an extract from the beginning of the narrative:

'In the year 1987, the Dept of Health and Social Security, as well as Police and State Security



records of the United Kingdom were co-ordinated within a central computerised data bank. The following year all passport, communications and censorship operations were integrated. In 1994, this computer network became responsible for the total defence and internal security of Westblock. Tuesday evening after tea and compulsory prayers, the machine rebelled.'

The game is a journey through life, which starts from a mouse dropping which is left inside 'The Machine'. With the aid of the keyboard you steer the 'life' as it grows, from its conception to old age. The audio tape is a mixture of narrative and music, a little like Jeff Waynes 'War of the Worlds'. The music is superb, with people like Ian Dury as The Fertilizer Agent, Donna Bailey as The Machine, Mel Croucher as The Defect, Edward Thompson as The Voice of Reason and even Frankie Howard as The Defect Police. I especially enjoyed Donna Bailey and Ian Dury's Songs. All the music is performed and recorded by Mel Croucher using a host of musical instruments from a chinese lute to a Roland 808 percussion computer.

This is one of those things you either love or hate. I must admit that I loved it, and quite often go out walking the dog at night with a personal cassette playing, just to hear the music. There are about seven different screens to go through, which are a series of fairly simple games, but are graphically very well drawn. However, when combined with the music, they seem to be hypnotic. The games themselves are not games in the ordinary sense, but more like tasks to be carried out in order to keep yourself alive. However, for those of you who like to see how well you have done, a score is kept which is shown as a percentage. Be prepared to sit down for at least an hour and a half to get through the whole tape.

It's very hard to review this tape as it's hard to relate the experience in words. The best thing to do is to rush out and buy it — if you want something different then I don't think you will be disappointed. Deus Ex Machina is written by Andrew Stagg for the 48K Spectrum and will cost you around £10.00.

Trio by Silicon Joy

Three games on one tape, hence the title. The first of these is **Dracula's Castle**. The scenario is a maze of rooms (Pacman style) inside the castle which has bats flying everywhere. While Dracula sleeps in his coffin you have to rise from your bed and rush around turning on the lights to score points. If you happen to bump into a bat you are stunned, unless you find some garlic first, which turns you green and allows you to eat the bats. Every hour (about 1 minute in real time) a clock strikes and Dracula awakes and rushes around switching the lights off. If he finds you, you are killed. An excellent game considering that it's only one of three.

The next game in the trilogy is **Ascot**, a horse racing game. In this you have to study form before each race and starting with your stake money can either bet to win or place. Once you have placed your bets the race is shown with some well drawn but fairly simple graphics.

The third game is a simple maze of corridors. As you move your man around, you leave a yellow trail, and the idea is to go down every corridor. To stop you is a series of nasties which zoom up and down trying to kill you on contact. If you manage to clear the first maze, another maze appears which is a little longer.

All the games on this tape are very enjoyable and should keep everyone of all ages amused.

Varitalk by I.T.S. Software

There are many speech synthesizers on the market in the hardware dept, but you don't see many purely software ones. Well, here is one for the 48K Spectrum called **Varitalk**. It uses the phonetic code system and is very simple to use. Once the tape is loaded it appears to crash, but don't worry — it is stored in memory. There are 52 different sounds to use plus a 'pause' button. All these sounds are recorded from actual human voices and the computer then turns the sounds into digital form which it can understand. To bring back these sounds you simply use a line number and type: LET T$=D2A1R1:RANDOMIZE USR 33600. This will produce the word 'there'. Each sound has a code consisting of one letter and one number. On the inlay there is a list of codes and words which contain the sounds.

The only trouble I found using phonetic codes is that you understand what is being said but no-one else can. With this system it sounds like a Dalek with a bad cold, and full sentences are hard to understand.



Still, I won't write this tape off as a novelty. You could use it in your programs to enhance a warning signal, for example if you have written a program where you are attacked by the dreaded aliens then you could have the words 'alien attack' flash on the screen as well as your computer shouting the words at the same time. Another good use I found is to put one sound into a loop. Doing this you can produce some interesting sound effects. For a laugh I had different shapes moving around the screen and used different sounds to accompany them.

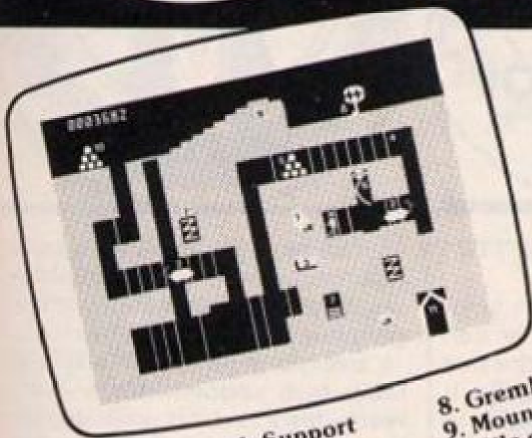
As a speech substitute I'm afraid I didn't rate it too highly, but still worth buying for the sound effects. ■

LOOK!

NOW THERE ARE 3

HI-RES PROGRAMS FOR THE 16K ZX-81

SOFTWARE FARM



1. Nuggets
2. Giant Rats
3. Burrowing Rat
4. Support
5. Cave In
6. Snake
7. Snake Nest
8. Gremlin
9. Mound
10. Pile of Earth
11. Cave

FORTY NINER

In 1849 the Great American Gold Rush started. Almost everyone who could sold up everything and dashed to the west coast to look for this precious metal – including you!

You must excavate this precious metal – but can you survive the giant rats and that vicious Gremlin which will come to infest your mine? Can you trick the snakes into leaving their comfortable nests and destroy the rats for you? Can you keep the Gremlin at bay?

Riches await you – but so do the hazards!

ROCKET MAN

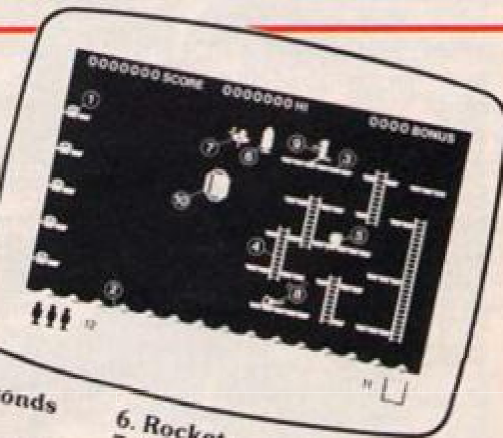
Get rich quick by collecting Diamonds that are simply lying there waiting for you!

Oh . . . I forgot to mention that there are one or two problems!

There is an expanse of shark infested water between you and the Diamonds and a strange breed of Bubble that seems hell bent on getting you in it! Somehow you must cross it . . . .

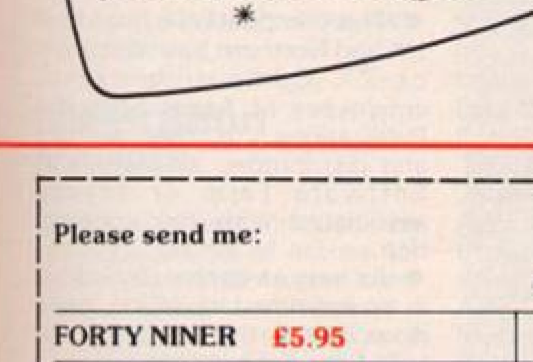
You have a Rocket Pack to help you (a Vulture on higher levels) but you must rush around the platforms and ladders collecting cans of fuel (legs of lamb with the Vulture) and cursing that weird Bubble. Once you have enough fuel then it's Chocks Away!

Oh . . . but don't run out of fuel on the way – otherwise it's . . . SPLASH!



1. Diamonds
2. Sea
3. Platforms
4. Ladders
5. Fuel Cans
6. Rocket
7. Vulture
8. Leg of Lamb
9. Player
10. Bubloid
11. Fuel Gauge
12. Men remaining

w-new-new-new-new-ne



Z-XTRICATOR

A long time ago, in a galaxy far, far, away a terrible war took place between two hostile races. Any prisoners taken could not expect to live very long in the hands of their captors. Their only hope lay with a group of valiant warriors – the XTRICATORS – whose task it was to rescue fellow beings from the alien planet's surface. You are about to take on the role of such a warrior . . . .

Please send me:

		QTY	TOTAL AMOUNT
FORTY NINER	£5.95		
ROCKET MAN	£5.95		
Z-XTRICATOR	£5.95		
		TOTAL	

ZX

Available from all good computer shops or send cheque/P.O. for £5.95 (inc. P&P) to:
Software Farm,
FREEPOST (No stamp required) (BS3658), BS8 2YY.

Software Farm, 155 Whiteladies Road, Clifton, Bristol BS8 2RF.
Telephone (0272) 731411. Telex 444742 AFMADV G

HARVEST TIME AT SOFTWARE FARM

ZX81 owners need no longer feel neglected, this competition is just for them!

Ooh arr me dears, down in wess country we be workin'ard ter keep up with the demand fer our games. T'old Cosmic Cockerel be knacked with all the extra work. Still we baint gonna let T'old ZX81 die out are we eh?

All right I admit it, I wrote this and not Julian Chappell who is the owner and programming genius behind Software Farm and their superb hi res ZX81 games. The trouble is that we all have this image of slow witted, smock garbed, straw chewin' yokels when we think of England west of Reading!

It still seems so to many suppliers when Julian attempts to get his ZX81 programs into the shops — "You're not still writing programs for that machine, no one owns one of those nowadays" — is a typical comment in spite of the fact that the ZX81 was THIRD in a recent owners' poll!

The best service available for ZX81 owners is from this company, obviously they are promoting their programs, but also they supply the best and most informative newsletter, the most helpful enquiry service based on the '81 that I know of. This is supplied through their own ZX81 owners software club which they run and which costs £4.00 a year (£5.50 outside Britain) or £10.00 for life membership.

Julian assures me that this club is non profit making and, seeing the work that goes into an issue of the newsletter I can well believe it!

Now, members of their software club get a badge, or can buy a T shirt, with the distinctive "Cosmic Cockerel" logo on it and they are urged by SF to "wear it with pride, and not be ashamed of your ZX81", a sentiment I approve of.

The Prizes

For the first TEN winners of our competition we, the Cockerel and ZXC, are offering a year's free membership of the Software Farm ZX81 owners club, plus a T shirt, plus the choice of one of their highly acclaimed games.



The next ten runners up will also get a year's free membership to the software club and the game of their choice.

Everyone who enters will receive a voucher from Software farm which will enable them to claim £1.00 off a life membership to be club. You really can't lose!

So, study the competition and post your entry right away.

The Competition

All we want you to do is to make as many words as possible, using the letters in SOFTWARE FARM. Apart from A and R, which you may of course use twice, all the letters may only be used once in each word.

We will check all answers against the Oxford paperback Dictionary and the winners will be those who find the highest number of words.

To Enter

Write your words, in alphabetical order, on a sheet (or two) of paper and add your choice of game (Forty niner, Rocketman, Z-xtricator) and your T shirt size, (small, medium, large).

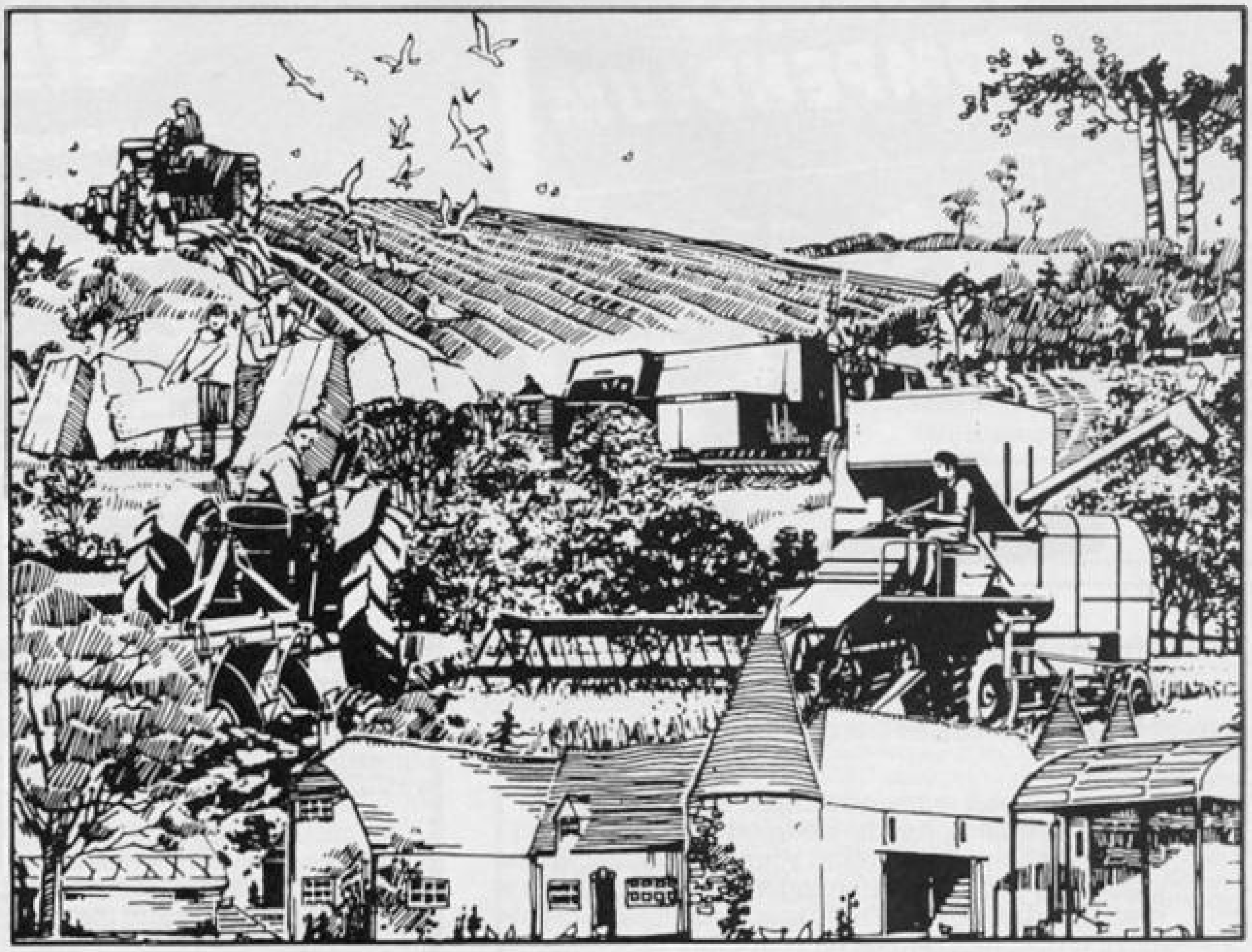
Put your entry in an envelope and write in the top left corner on the BACK of it, the number of words which you made, stamp it and post it to us then sit back and keep your fingers crossed!

The rules

- This competition is open to all UK and Northern Ireland readers of ZX Computing except employees of Argus Specialist Publications Ltd, their printers and distributors, employees of Software Farm or anyone associated with the competition.
- As long as each entry is sent in an individual envelope, there is no limit to the number of entries from each individual.
- All entries must be postmarked before 31st May 1985. The prizes will be awarded to the

twenty entrants who make up the most words from the name SOFTWARE FARM. No correspondence will be entered into regard to the results, and it is a condition of entry that the Editor's decision is accepted as final.

• The winners will be notified by post and the results will be published in a future issue of ZX Computing.



Unique competition

I'm afraid that those people announced as winners in last year's Unique competition (August/September) have had a rather long wait for their prizes. Unfortunately, although we supplied Unique with the names and addresses of the winners some time ago, we have had no reply from them despite numerous attempts to contact them. We will therefore, arrange for alternate prizes to be sent out to all the winners as soon as we can, and apologise to all concerned for any disappointment they may have experienced.

Prism competition

Prism on the other hand, were kind enough to contact us within a matter of days after we sent them the list of winners in the 'Movit' competition, to tell us that the prizes were already in the Post. Winners should have received them by the time they read this.

Temptation winners

Having ploughed through the enormous stacks of entries for the Temptation Software competition (December/January) I can now announce the names of the 60 winners. It was quite noticeable that the entries were divided almost 50/50 between owners of Spectrums and ZX81s, with Spectrums having an extremely slight advantage. Anyway the winners are:

Stephen Waterhouse of Cleveland
J.C. Peach of London
Thomas McCreadie of Ayreshire
Peter Simpson of Spain
M.L. Rostance of Wales
Mrs S. Mackman of Lincolnshire
Mrs A.R. Anderson of Dartford
Lawrence Millea of Liverpool
Paul Nesbitt of Kidderminster
E.J. Rowe of Gosport
John Merrigan of London
John Whittle of Merseyside
A.W. Abbot of Wales
Christopher Stapleton of Lincolnshire
Alex Dyke of London
Matthew Hales of Suffolk
Sarah Fry of Coventry
Mike Bedford-White of Birmingham
L.T. Gardner of Herts
James Nickolls of Sussex
James Hawkins of Bristol
E.W. Fairweather of Lincoln
Mr Alan Logie-Campbell of Cheltenham
Robin Law of Coventry
Mrs E. Sadler of Chelmsford
B.E. Collins of Fife
M. Souter of Fife
M.J. Parker of Letchworth
A. Jackson of Hull
Matthew Sadler of Chelmsford
Henry Morton Stanley of Sanderstead
G.R. Dykes of Southampton
D.D. Cockitt of Birmingham
Mr A.E.W. Greenwall of St. Albans
Ian Ward of Northampton
Mr M.F. Barrett of Colchester
David Condillac of Liverpool
K.L. Inman of Sheffield
D.J. Bauernfeind of Luton
Christopher Worthington of Macclesfield
Walter Scott of Coventry
Mr M.A. Tate of Enfield
John McMullen of Irvine
Stephen Higgins of Hounslow
Mrs N. Hamilton of Devon
Jason Rowntree of Cumbria
W.D. Harrison of Leeds
Eric Landers of Hastings
Kevin McGowan of South Wirral
Martin Lyford of Wales
Mr R.F. Norman of Maidenhead
J. Royle of London
D.G. Knapp of Essex
E.A. Gilchrist of Dunstable
Mr G.M. McEwan of Scotland
Anthony J. Beer of Sussex
Mark Baller of Birmingham
Daniel Wilson of Bristol
Mr P. Hayward of Nuneaton
Eric R. Waters of Brighton

Our congratulations to all of the above, but if you weren't a winner, don't be disheartened as there are a lot more competitions to come. ■

Spectrum lessons

Mike Edmunds administers a gold star or rap on the knuckles to a mixed bag of Educational software.





Almost everyone in the field of education, and beyond, must have, by now, accepted the fact that the computer has served its period of apprenticeship within the school. It has, for the most part, found an acceptable and valuable role within the school curriculum.

Although this statement may be challenged by many, it is nonetheless obvious that the computer is destined to become an even more integral part of our children's education in the future and, though not all of us may like it, as teachers and parents we have an obligation to see that its full potential is realised.

Educationally the computer is, at the very least, the equivalent of an "electronic wordcard" and can be thought of as a valuable resource to sit alongside the Maths equipment and the reference books.

From the early days (it is really only 2 years since the DOI package?) when there was a mad scramble for any software that could remotely be labelled as 'educational' we have, thankfully, become more discerning, and parents and teachers alike now look carefully to decide whether or not a particular program really fulfills a need.

The criteria by which we can judge a particular program are many and varied, but essentially there is now a more enlightened attitude about what constitutes quality software. The standard of educational programs has increased tremendously in what is really a very short time — the user can now afford to be choosy. The content of programs must increasingly be adaptable and of lasting value, able to offer an ever widening range of experiences.

That is not of course, to ignore totally the ever present 'drill and practice' programs which still have their uses, but nowadays a program must be seen to be of 'real' value to earn its place in an educational context.

The batch of programs under review this issue appear to cover a wide area of interest but not all live up to the high standards which teachers and parents alike have a right to expect from 'educational software'.

Educational Cassette One Turtle Software

Firstly, from a newcomer to the education scene, Turtle Software, comes **Educational Cassette One**. This is intended for children of six to eleven, and contains four programs; Maths, Hangman, Co-ordinates, Alphabet Tutor and Compass.

The programs all come under the 'drill and practice' banner in that they are intended as reinforcements of work already taught, but the overall impression is nevertheless one of quality. The first page of the comprehensive instruction pamphlet outlines the aims of the programs and then proceeds to give an analysis of the individual programs. Each program is identified by filename, number of bytes and loading time.

The individual structure of each program is detailed, together with lists of the UDG's and variables used, and a list of suggested modifications for tailoring to your own purposes. The contents of each of the programs are evident from their titles, but each has been designed to make the practice an enjoyable experience.

Colour, sound and graphics are excellent throughout and each program is very user-friendly, guiding the pupil effectively through outlines of the concepts involved and then testing by means of a game. The programs have been fully tested in schools and provide an ideal method of learning reinforcement, although I see the real value of this as being a package to stimulate and extend the fun of learning at home.

If what you want are some well designed drill and practice programs then at £4.95 this is value for money. Available from Turtle Software, 'Wychwood', School Road, Finstock, Oxford OX7 3DJ.

Maths: Educational Software

From Educational Software comes a **Maths** tape. No instruction sheet so it was a question of plunging straight in!

A colourful Instruction screen leads you to a selection screen with options for each of the four rules as well as tables and fractions, together with a new name option. This tape therefore, is presumably, intended for school use.

Being a glutton for punishment, I selected the hardest level of + and −, however this wasn't very hard. The numbers are formed from large block graphics and are easy to read, especially for the younger (say, Infant level) child. This section is preceded by a tune which quickly becomes irritating, but is thankfully short.

The questions must be answered correctly, wrong answers just give you the opportunity to try again until you get it right. There is no reward apart from the tune (!) and a message giving your score as a percentage. I can't see Infants understanding precentages however.

Division next . . . small figures here, but essentially the same format. Similarly with Multiplication, although here there is a wider range of problems, ranging from Tens and Units multiplied by unit, right up to multiplication of decimals.

Tables next and, in common with all sections this has a different graphic introduction again, unfortunately accompanied by the tune. The 'times' sign here was only the Spectrum * and that really is not acceptable, even for those children familiar with computers.

The final option is Fractions and apart from the recent move away from all but the simplest fraction work for children of Primary age. . (. . . you didn't come across that whilst reading your Cockroft Report!) this section has a rather nasty way of working out the answers.

If, for example the question requires 2/5 + 5/8, then entering 41/40 should be right, but it wasn't. The program kindly informs you that the answer is "not perfect" and should be "1". There are even more extreme examples of this nature. So even though the program has gone to great pains to dress up with graphics and sound what is just another drill/practice variation I am afraid, for me at least the result is "not quite perfect," and because of the alarming fractions bug I cannot recommend this in any way whatsoever in its present form.

Educational Software are at: 20 Beaufont Rd., Camberley.

Educational Compendium Orwin Software

Michael Orwin will be well known for many of his games compendiums. Here, he tries his hand at **Educational Compendium 1**.

This has been available for about a year now and, on the whole, can be recommended. There are 16K and 48K programs on the same tape, the 48K program being an enhanced version of one of the 16K programs.

The first side provides nothing that is not also available elsewhere, but all the games have a nice feel about them. . . Equivaders is where you fire 'correct' signs at alien equations and Reveal is a very elaborate form of cloze procedure (essentially a difficult type of Hangman), where you can buy all occurences of a letter or predict where a certain letter will appear. One point here is that, if you use a monitor, the placement cursor disappears. . . but on a television set the problem is not noticeable!

There are 20 different texts stored on the tape for this program and there is also an option to create your own. Fairly comprehensive, if not entirely original.

The second side has variations of turtle graphics, more commonly recognised as Logo language which allows quite complex drawing of patterns and geometric shapes on screen. Tortmaze and Tortrail are games to introduce you to the procedures that you will encounter in the tortoise graphic program proper. This is quite versatile and provides all the options of the real Logo, including the storage of your own procedures (here called macros).

The biggest problem with the whole program however lies with these macros. I wanted to see the procedure which drew a "street" so I "called it up" and waited. . . and waited. . . and went and had tea, and waited. As you have guessed, it is very SLOW. Maybe there was a way of speeding it up but I couldn't find it. Apart from the macros the whole program works beautifully.

The programs in this compendium work, are well designed and quite good fun. If you also want the advantage of a cheap version of Logo (Sinclair's being around £30) then look no further. Nine programs for £6 is worthwhile. Available from Orwin Software, 26 Brownlow Road, London NW10 9QL.

Spelling Bee Image Systems

Two programs with a foreign flavour next. Firstly **Spelling Bee** from Image Systems. This has an option for English or French and there are two difficulty levels.

Side one is easy, side two hard. No age levels are given but it would be usable from five upwards, and of benefit for those just beginning French.

There are four levels, all of which follow the same format; a picture is drawn and you must name it! All the pictures have been painstakingly built up using the block graphic variations but are well done.

The problem occasionally occurs of recognition, but as the same sets are used throughout the child soon learns what is what. Nice graphic rewards with a score and the whole tape is easy to use.

The french aspect just requires words using exactly the same pictures. I suppose this is yet another drill and practice program, and as such might not find much of an acceptance within the classroom but would prove to be a good 'home educational' type program. Image Systems are at: 34 Lynwood Drive, Worcester Park, Surrey KT4 7AB.

Learn German Chalksoft

Learn German with Das Schloss from Chalksoft. This is a game which teaches and tests your knowledge of German. As such, it is intended for those with some grasp of the language although it could be used by beginners with a bit of help.

There are ten lists available, helping the tourist and student alike. The idea is another version of cloze, a missing word being required. . . this time in German. The English translation of the word is given and success



means another day's work has been completed on Das Schloss (The castle).

The castle is completed after 22 correct answers, although you can cheat with a judicious use of the ENTER key!

There is an option to use any of the different lists supplied or to create and use one of your own. Chalksoft claim that. . . "These programs are invaluable to children and adults who are learning German. In fact they are useful to anyone who wants to brush up on their German vocabulary." For once I agree with the inlay card! This is a computerised phrase book, although it might be a bit unwieldy to carry around. Learn German costs £7.45, from Chalksoft, P.O. Box 49, Spalding, Lincolnshire.

The Princess and The Wicked Witch Finsbury Computers

And now a tale of medievel terror. From Finsbury Computers Ltd comes the story of the Prince, the Princess and the Wicked Witch.

It seems that in the land of Mundania everyone is happy, all except the wicked witch who just cannot stand to see people enjoy themselves. So, without more ado she flies off to the Royal Palace and kidnaps Princess Serena, whisks her away to her castle which she then proceeds to make invisible.

Enter Prince Roland to save the day, only it turns out that the witch has set lots of little traps along the way and Prince Roland can't solve them without your help. . .

What this all boils down to is a simple practice program for children who are at the basic stages of Maths. The program is graphically excellent but has nothing new in content. The reward of the program is, of course, to save the Princess and there are some nice touches along the way.

The error trapping of answers is rather suspect and needs to be sorted out. Apart from this there are no real problems and this may well appeal to the younger home user. . . , but once you've saved one princess. . . !

In conclusion, this month's batch of programs have, for the main, fallen into the drill and practice heading and although of varying quality, they nevertheless cause me to reiterate a question I posed a few issues ago. . . where are all the innovative educational programs?





PLATFORM JACK

A three screen platform game from Minehead's jumpin' John Silvera!

Up and down, up and down, what a job! and I don't even get danger money. The problem is that I have to work out the order in which to make my rounds otherwise I lose my pay bonus — or even my life.

All I can really say is "HELP!!!"

Although this program is written entirely in BASIC, it incorporates some clever graphic routines, imaginative sounds and a nice starting tune.

All instructions for play are shown when the program is run. You will find that in places you cannot jump, but do not worry, there is always a route for you to follow.

On each set there is only one main route so watch where you are going.

Program structure

10-30	Initialise
100-500	Main loop
1000-1999	Screen 1
2000-2999	Screen 2
3000-3999	screen 3
5000-5999	Set up frame and screen variables
6000-6400	Jumping routines
7000-7100	Death routine
7110-7499	Ask for another go
7500-7599	End of set
8000-8999	User defined graphics
9000-9071	Title page
9080-9599	Instructions
9600-9605	Set up variables and start game
9620-9670	Completed game
9700-9800	Starting tune

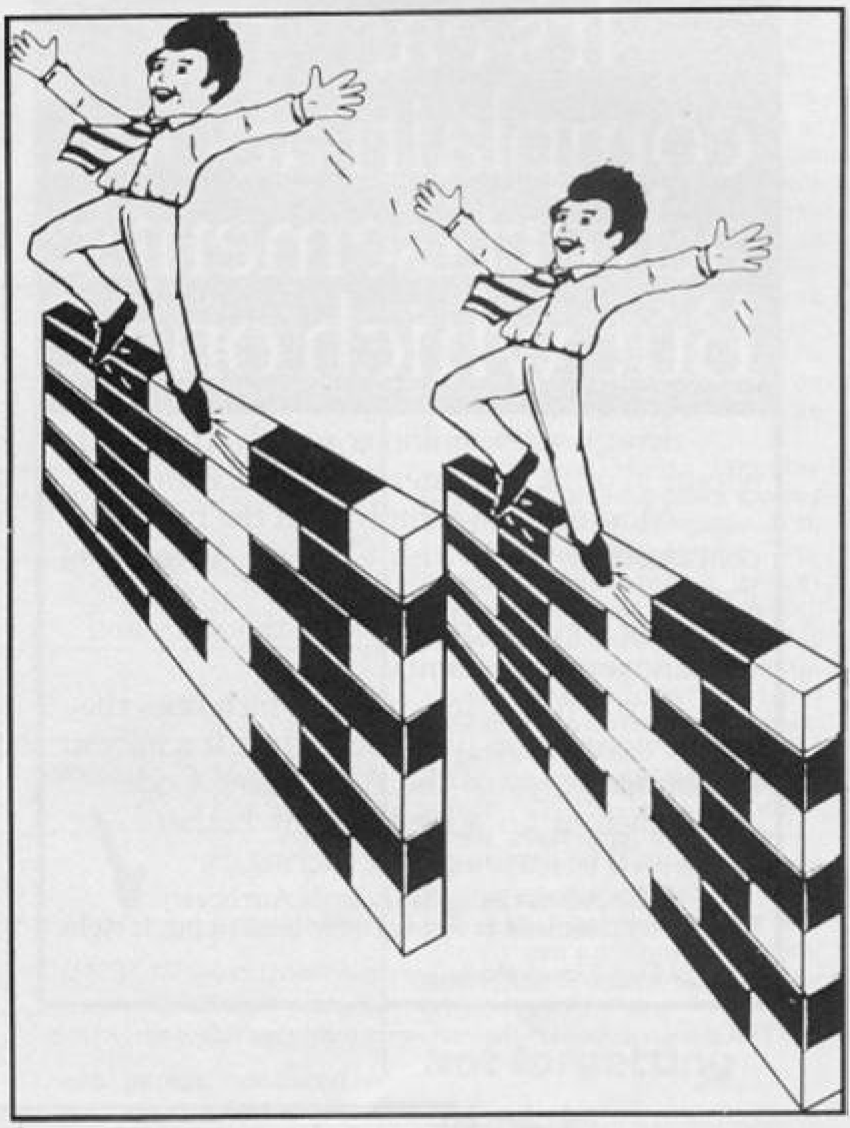
The listing for Platform Jack

```
   1 REM ***********************
        *Underlined characters*
        *are entered in       *
        *GRAPHICS mode.       *
        ***********************
  10 IF PEEK USR "a"<>255 THEN
 GO SUB 8000
  20 GO SUB 9000
  30 GO SUB 1000
  40 LET xx=x: LET yy=y
 100 IF xx=x AND yy=y THEN  GO T
O 105
 101 PRINT AT yy,xx;" ";AT y,x;C
HR$ (ch): LET xx=x: LET yy=y
 105 IF sh=1 AND it=4 THEN  PRIN
T  FLASH 1; BRIGHT 1; INK 4;AT 1
3,1;"J"
 106 IF sh=2 AND it=9 THEN  PRIN
T  FLASH 1; BRIGHT 1; INK 4;AT 1
0,4;"J"
 107 IF sh=3 AND it=15 THEN  PRI
NT  FLASH 1; BRIGHT 1; INK 4;AT
18,4;"J"
 109 IF it=15 AND y=18 AND x=4 T
HEN  GO SUB 7500: GO SUB 9620
 110 IF ATTR (y,x)=252 THEN  LET
 sh=sh+1: GO SUB 7500: GO SUB (1
000*sh)
 120 IF (INKEY$="z" AND f=3 AND
ATTR (y,x-1)<>40) THEN  LET x=x-
1: LET j=1: LET ch=159
 125 IF (INKEY$="x" AND f=3 AND
ATTR (y,x+1)<>40) THEN  LET x=x+
1: LET j=0: LET ch=160
 128 IF INKEY$="a" THEN  RUN
 130 IF (INKEY$="m" AND x>3 AND
x<29 AND ATTR (y-1,x)<>40 AND AT
TR (y-1,x+1)<>40 AND ATTR (y+1,x
)=40) AND ATTR (y-1,x-1)<>40 THE
N  GO SUB 6000
 140 IF (INKEY$="k") THEN  GO SU
B 4000
 230 IF ATTR (y,x)=57 OR ATTR (y
```

```
,x)=58 OR ATTR (y,x)=62 THEN  LE
T it=it+1: BEEP .004,y: PRINT AT
 0,6;it
 245 IF ATTR (y+1,x)<>40 AND ATT
R (y<4,x)<>40 THEN  LET dr=dr+1:
 IF dr<>5 THEN  GO TO 249
 247 LET dr=0
 249 IF dr=4 THEN  GO SUB 7000
 250 IF ATTR (y+1,x)<>40 THEN  P
RINT AT y,x;" ": LET y=y+1: LET
f=2: BEEP .005,y: GO TO 100
 255 IF ATTR (y+1,x)<>40 AND ATT
R (y+5,x)<>40 THEN  GO SUB 7000
 270 IF ATTR (y,x+1)=59 OR ATTR
(y,x-1)=59 THEN  BEEP .01,x: PRI
NT AT y,x-1;"  ": LET sc=sc+5
 280 IF ATTR (y+1,x)=40 THEN  LE
T y=y: LET f=3
 290 IF ATTR (y+1,x)<>40 AND ATT
R (y+5,x)<>40 THEN  GO SUB 7000
 300 LET l=l+1: IF l>16 THEN  LE
T l=9
 500 GO TO 100
1000 REM screen1
1005 LET d$="AAAA": LET b$="AAA"
: LET c$="AA"
1010 GO SUB 5000
1020 PRINT  INK 0; PAPER 5;AT 4,
0;b$;c$;AT 4,6;c$;AT 4,9;d$;AT 4
,25;d$;AT 5,13;c$;AT 6,13;d$;AT
7,3;d$;AT 7,13;b$;b$;AT 7,20;b$;
b$;AT 7,28;b$
1035 PRINT AT 18,1; INK 0; PAPER
 5;c$;AT 19,1;d$;AT 20,1;b$;b$
1040 PRINT  INK 0; PAPER 5;AT 10
,0;b$;AT 10,23;b$;AT 10,27;d$
1050 PRINT  INK 0; PAPER 5;AT 12
,3;c$;AT 13,17;b$;b$;AT 13,24;c$
;AT 16,26;d$;AT 20,24;c$
1060 PRINT  INK 0; PAPER 5;AT 13
,5;c$;AT 14,7;c$;AT 15,9;c$;AT 1
6,12;c$;AT 17,15;c$;AT 18,18;c$;
AT 19,21;c$
1065 PRINT  PAPER 5; INK 0;AT 14
,1;c$
1070 PRINT AT 18,29; INK 0; PAPE
R 5;c$
1080 PRINT  PAPER 7; INK 6;AT 17
,1;"H"; PAPER 7; INK 2;AT 3,1;"I
";AT 11,2;"I";AT 12,17;"I"; PAPE
R 7; INK 1;AT 6,30;"B"
1999 RETURN
2000 REM screen2
2005 CLS
2010 GO SUB 5000
2020 PRINT  PAPER 5; INK 0;AT 4,
7;"A";AT 4,9;c$;AT 4,12;d$;d$;b$
;c$;AT 4,26;c$;AT 4,29;c$;AT 6,2
7;c$;AT 7,13;b$;AT 8,11;c$;AT 8,
16;b$;AT 8,24;b$;d$;AT 10,18;c$;
AT 10,24;c$
2030 PRINT  PAPER 5; INK 0;AT 11
,11;c$;AT 11,14;"A";AT 11,16;c$;
AT 12,24;c$;AT 13,26;c$;AT 14,28
;b$
2040 PRINT  PAPER 5; INK 0;AT 4,
1;b$;c$;AT 7,5;b$;AT 8,3;c$;AT 1
0,1;c$;AT 11,3;c$;AT 11,8;c$;AT
13,5;d$
2050 FOR i=14 TO 20 STEP 2: PRIN
T  PAPER 5; INK 0;AT i,4;"A": NE
XT i
2060 PRINT  PAPER 5; INK 0;AT 8,
8;c$;AT 16,9;b$;c$;AT 16,15;c$;A
T 16,25;c$;AT 17,17;c$;AT 17,27;
"A";AT 18,25;"A";AT 18,28;"A";AT
 20,25;"A";AT 20,19;c$;AT 20,3;"
A"
2070  PRINT  PAPER 7; INK 1;AT 3
,1;"B";AT 15,26;"B"; PAPER 7; IN
K 2;AT 3,30;"I";AT 9,19;"I"; PAP
ER 7; INK 6;AT 15,4;"H"
2500 LET x=30: LET y=10
2999 RETURN
3000 REM screen3
3005 CLS
3010 GO SUB 5000
3015 LET b$="AAA": LET c$="AA"
3020 PRINT  PAPER 5; INK 0;AT 5,
1;b$;AT 5,9;c$;AT 5,12;b$;c$;AT
6,4;c$;AT 7,6;b$;AT 8,9;"A";AT 8
,12;c$;AT 9,15;c$;AT 10,2;c$;AT
10,10;"A";AT 10,17;c$;AT 10,21;"
A";AT 11,4;c$;AT 12,7;c$;AT 12,9
;"A";AT 12,17;c$;AT 12,21;"A";AT
 13,15;c$;AT 14,10;c$;AT 14,12;b
$;AT 14,20;c$;AT 16,9;"A";AT 16,
20;c$;AT 17,17;c$
3030 FOR i=1 TO 11: PRINT  PAPER
 5; INK 0;AT 18,5+i;"A";AT 4,20+
i;"A";AT 8,20+i;"A": NEXT i
3040 FOR i=13 TO 18: PRINT  PAPE
R 5; INK 0;AT i,5;"A": NEXT i
3050 FOR i=11 TO 19 STEP 2: PRIN
T  PAPER 5; INK 0;AT i,30;"A": N
EXT i
3060 FOR i=5 TO 7: PRINT  PAPER
5; INK 0;AT i,21;"A": NEXT i
3070  PRINT  PAPER 5; INK 0;AT 1
3,1;c$;AT 15,3;c$;AT 17,1;c$;AT
19,3;c$;AT 15,26;c$;AT 17,25;b$;
AT 18,27;c$;AT 19,25;b$;AT 10,21
;c$;AT 12,21;c$;AT 6,30;"A"
3080 PRINT  PAPER 5; INK 0;AT 5,
19;c$;AT 7,18;c$;AT 20,23;c$;AT
18,28;"A";AT 12,27;"A";AT 12,29;
"A"
3090 PRINT  PAPER 5; INK 0;AT 14
```

```
,28;"A"
3100 PRINT  PAPER 7; INK 1;AT 4,
1;"B";AT 11,28;"B"; INK 2; PAPER
 7;AT 7,30;"I";AT 20,1;"I"; INK
6; PAPER 7;AT 7,12;"H";AT 20,25;
"H"
3600 LET x=15: LET y=2
3999 RETURN
4000 IF ATTR (y-1,x)<>40 OR ATTR
 (y-2,x)=40 THEN  RETURN
4005 PRINT AT y,x;" ": BEEP .007
,y-1: BEEP .005,10
4010 IF ATTR (y-2,x)=62 THEN  BE
EP .005,0: LET it=it+1: PRINT AT
 0,6;it
4020 LET y=y-2: BEEP .007,15: PR
INT AT y,x;CHR$ (ch)
4500 RETURN
5000 REM Frame
5010 PRINT  PAPER 5; INK 0;AT 1,
0;"AAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAA";AT 21,0;"AAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAA"
5020 FOR i=1 TO 20: PRINT  INK 0
; PAPER 5;AT i,0;"A";AT i,31;"A"
: NEXT i
5030 PRINT AT 0,0;"Items ";it;AT
 0,13;"Men ";m;AT 0,24;"Sheet ";
sh
5100 IF sh=1 THEN  LET x=26: LET
 y=2
5110 IF sh=2 THEN  LET x=30: LET
 y=10
5120 LET ch=159
5999 RETURN
6000 REM Jump
6010 IF j=0 THEN  GO TO 6110
6020 PRINT AT y,x;"S": BEEP .01,
13
6025 FOR i=1 TO 10: NEXT i
6030 PRINT AT y,x;" ": LET y=y-1
: BEEP .01,16
6040 LET x=x-1: PRINT AT y,x;"T"
: BEEP .01,18
6045 FOR i=1 TO 10: NEXT i: PRIN
T AT y,x;" ": BEEP .01,21: LET x
=x-1
6050 IF ATTR (y+1,x)=40 THEN  RE
TURN
6060 LET y=y+1: PRINT AT y,x;"E"
6100 RETURN
6110 PRINT AT y,x;"R": BEEP .01,
13: FOR i=1 TO 10: NEXT i: PRINT
 AT y,x;" ": BEEP .01,16
6200 LET x=x+1: LET y=y-1: PRINT
 AT y,x;"U": BEEP .01,18: FOR i=
1 TO 10: NEXT i: PRINT AT y,x;"
": BEEP .01,21: LET x=x+1
6225 IF ATTR (y+1,x)=40 THEN  RE
TURN
6230 LET y=y+1: PRINT AT y,x;"E"
6400 RETURN
7000 REM die
7010 FOR v=y TO 20: BEEP .01,y:
PRINT AT v,x;"N": FOR n=1 TO 4:
NEXT n: PRINT AT v,x;" ": IF ATT
R (v+1,x)<>40 THEN  NEXT v
7020 PRINT AT v,x;"F": BEEP .04,
10
7030 FOR i=1 TO 30: NEXT i
7040 PRINT AT v,x;"G"
7045 FOR i=1 TO 30: NEXT i
7050 LET m=m-1
7060 PRINT AT 0,17;m
7070 IF m<1 THEN  FOR i=1 TO 200
: NEXT i: GO TO 7110
7080 PRINT AT v,x;" ": FOR i=-13
 TO 5: BEEP .01,i: NEXT i
7100 IF sh=1 THEN  LET x=26: LET
 y=2
7101 IF sh=2 THEN  LET x=30: LET
 y=10
7102 IF sh=3 THEN  LET x=15: LET
 y=2
7108 RETURN
7110 CLS : LET a$="Another go (Y
/N)"
7120 LET a=LEN a$
7130 FOR i=1 TO a: PRINT AT 10,i
+7;a$(i): BEEP .05,i/2: NEXT i
7140 LET a$=INKEY$: IF a$<>"y" A
ND a$<>"n" THEN  GO TO 7140
7150 IF a$="y" THEN  RUN
7160 IF a$="n" THEN  FOR i=50 TO
 -10 STEP -2: BEEP .01,i: NEXT i
: FOR i=-9 TO 50 STEP 2: BEEP .0
1,i: NEXT i: NEW
7499 STOP
7510 FOR i=1 TO 4: PRINT AT y,x;
"N": BEEP .3,-20: PRINT AT y,x;"
O": BEEP .3,-10: NEXT i
7520 FOR f=1 TO 5: PRINT AT y,x;
"K": BEEP .1,-f: PRINT AT y,x;"L
": BEEP .1,-f: PRINT AT y,x;"M":
 BEEP .1,-f: NEXT f
7599 RETURN
7999 STOP
8000 REM udg's
8005 RESTORE 8100
8010 FOR f=0 TO 167: READ a: POK
E USR "a"+f,a: NEXT f
8100 DATA 255,66,36,24,24,36,66,
0,0,6,38,24,80,32,0,0,66,126,66,
66,66,126,66,66,255,129,66,36,25
5,36,66,129,24,60,24,60,90,90,24
,24
8110 DATA 0,0,12,12,4,30,69,56,0
,0,0,0,0,11,139,124
```

```
8115 DATA 24,24,24,60,126,126,25
5,24,60,24,24,60,126,126,126,60
8120 DATA 154,60,89,199,126,91,1
54,60,4,73,18,36,73,146,36,73,0,
0,1,18,8,9,18,36,0,0,0,0,0,4,1,2
8130 DATA 24,153,90,60,24,24,38,
102,24,24,24,60,90,24,24,60
8140 DATA 24,24,8,28,42,24,20,34
,24,24,16,56,84,24,40,68
8150 DATA 12,12,10,30,40,20,36,7
2,48,48,80,56,20,40,36,18
8160 DATA 24,24,47,28,136,126,1,
0,24,24,84,48,17,126,128,0
8210 LET ch=159
8999 RETURN
9000 REM instructions
9010 BORDER 0: PAPER 7: CLS
9020 PRINT AT 10,10; INK 7;"PLAT
FORM JACK"
9060 FOR f=-47 TO 52 STEP 8: INK
 2: PLOT  OVER 1;131,5: DRAW  OV
ER 1;f,84: PLOT  OVER 1;131,170:
 DRAW  OVER 1;f,-72: PLOT  OVER
1;131,170: BEEP .003,-6: PLOT  O
VER 1;131,5: DRAW  OVER 1;f,84:
DRAW  OVER 1;f,-76: NEXT f
9070 PRINT  INK 1;AT 20,4;"P R E
 S S   A N Y   K E Y"
9071 GO SUB 9700
9080 CLS : PRINT  INK 2;AT 0,10;
"PLATFORM JACK"
9090 PRINT '' INK 0;"  You must
guide JACK through   the maze of
 platforms using:-"'"'Z to move
left"'"'X to move right"'"'M to
jump"'"'K to move up"'"You may o
nly go up if there is  a platfor
m directly above you."
9100 PRINT  INK 1'"Collect all t
he items on the setOnce you have
 completed this     you will move
 onto the next      level."'; INK
 2;" If at any time you think yo
u   can not complete the set the
n   press 'A' to abort."
9110 PRINT AT 19,7;"Any key to c
ontinue": GO SUB 9700
9120 CLS : PRINT  INK 2;AT 0,10;
"PLATFORM JACK"
9130 PRINT  INK 0;''';"  If you
jump onto one of the  items the
n this item will be   crushed m
eaning you have       failed to
 complete the set        press '
A' to abort and start  again"
9140 PRINT ''' INK 2;"   GOOD LU
CK!!!"'"   I think you'll"'"
 need it"
9500 PRINT AT 19,9;"Any key to p
```



```
lay": GO SUB 9700
9600 LET x=26: LET y=3: LET f=2:
 LET dr=0: LET j=1: LET it=0: LE
T m=3: LET sh=1: LET l=9: LET as
=2
9605 PAPER 7: INK 0: CLS : RETUR
N
9620 PAUSE 50: FOR i=1 TO 3: FOR
 o=1 TO 10: BEEP .02,o/(i+1)+RND
*10: NEXT o: NEXT i
9625 CLS
9630 GO SUB 5000
9640 PRINT  PAPER 6; INK 2;AT 7,
8;"CONGRATULATIONS"
9650 PRINT  INK 1;AT 10,11;"YOU'
VE DONE IT"
9660 PAUSE 100
9670 GO TO 7110
9700 REM tune
9705 RESTORE 9740
9710 LET q=.15: FOR f=1 TO 32: R
EAD be: BEEP q,be
9720 IF INKEY$<>"" THEN  RETURN
9730 NEXT f
9740 RESTORE 9750: GO TO 9710
9750 DATA -12,-5,0,-5,-17,-5,-1,
-5,-15,-3,0,-3,-20,-5,-1,-5,-19,
-3,0,-3,-12,-5,0,-5,-19,-3,0,-3,
-17,-5,-1,-5
```

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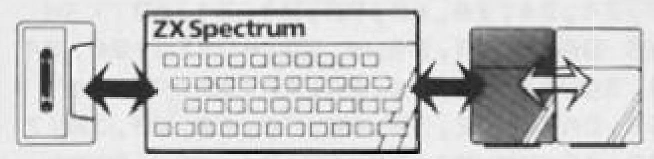
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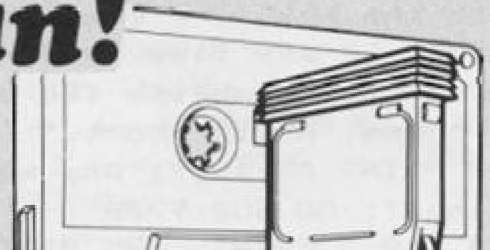
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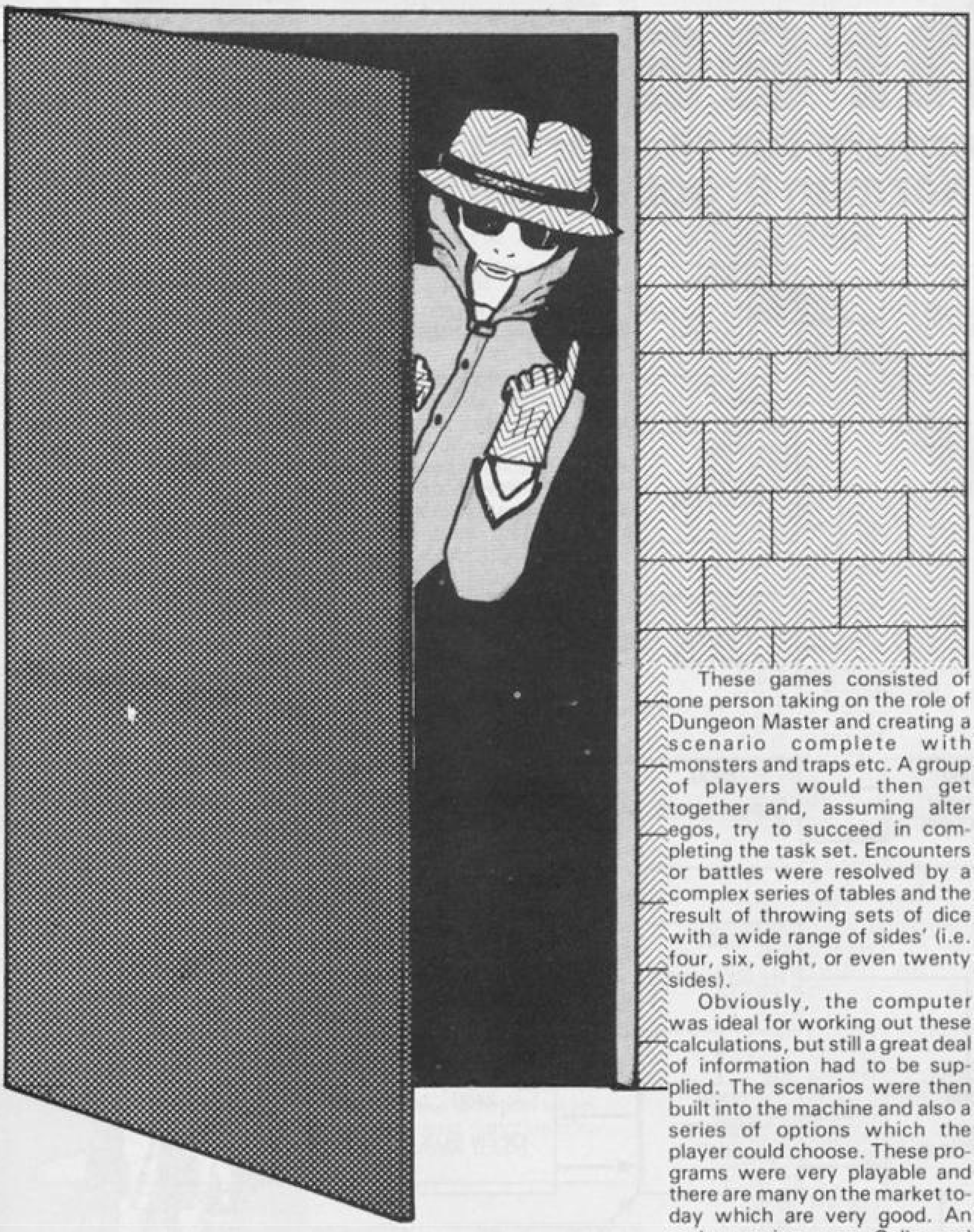
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CS

Come On In



Welcome to the Adventure Cave. In this section of the magazine we are presenting some programs, reviews and hints for both the hardened adventurer and the novice.

Adventure games have developed dramatically in the last few years and, for those who haven't yet tried this field of computer games, a few words of explanation may be called for.

Genesis

In general, the idea of an adventure is to get as close as possible to the role playing games introduced to GB nine years ago by Games Workshop from the USA. The classic, and still hugely popular, game from them was "Dungeons and Dragons" and the sword and sorcery theme runs through a great many computer simulations.

These games consisted of one person taking on the role of Dungeon Master and creating a scenario complete with monsters and traps etc. A group of players would then get together and, assuming alter egos, try to succeed in completing the task set. Encounters or battles were resolved by a complex series of tables and the result of throwing sets of dice with a wide range of sides' (i.e. four, six, eight, or even twenty sides).

Obviously, the computer was ideal for working out these calculations, but still a great deal of information had to be supplied. The scenarios were then built into the machine and also a series of options which the player could choose. These programs were very playable and there are many on the market today which are very good. An early version was Cells and Serpents by APS and the latest and very sophisticated is Legend by Century Software.

The second coming

These multiple choice programs were good, but the D&D player found them too restrictive. After all, the human mind can usually find a totally unexpected solution to a problem rather than the obvious!

Programs were then developed with a dictionary and an input decoding routine, these took the form of a two word input in the order VERB-NOUN i.e. Take Gun, Go North, Open Door etc. The majority of adventure games on the market follow this format and The Quill, the unique adventure writer's utility marketed by Gilsoft, produces this type of game. These are eminently playable and if the writer is good then they can be as absorbing as any of the more sophisticated games.

Melbourne House probably did more for adventure games than any other company with their program The Hobbit. This program featured a clever sentence decoding unit which allowed for a much more flexible input, many graphic representations of the locations and characters who had relatively independent action. This became a classic and was the game to which all others were compared, even now, though showing it's age, it still sells well. Of course Melbourne House have not rested on their laurels and Hampstead continues the tradition while Sherlock extends the limits even further.

Not forgetting

The first known computer adventure game was written in Fortran on a company mainframe and called Colossal Caves. Written by Crowther and Woods in 1978, Melbourne House now market a very close version under the title "Classic Adventure".

Armageddon

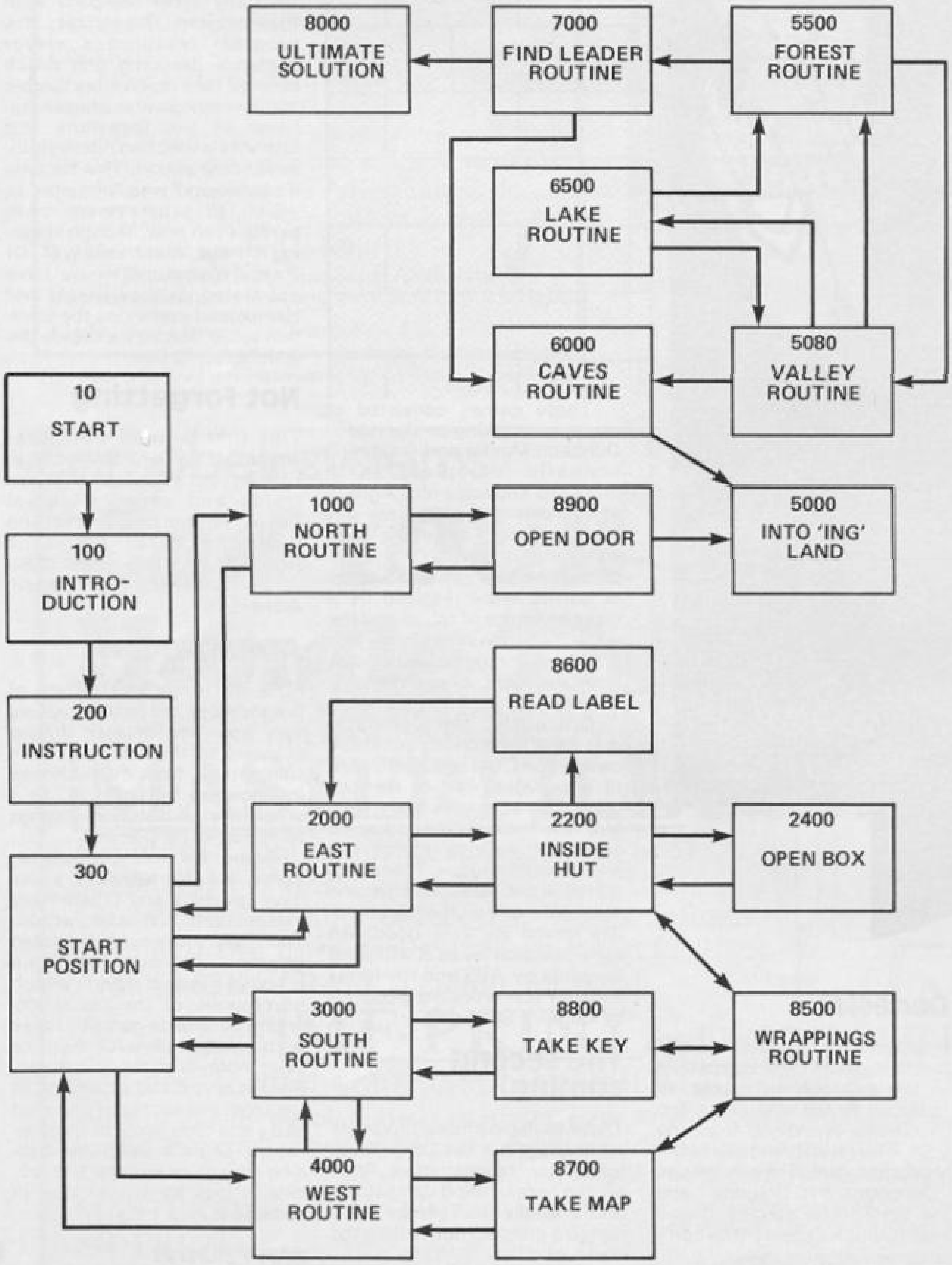
Now the range and variety of programs is incredible, themes vary from the fantastic dragon scenario to the ordinary, as in Hampstead, from the future (as in Snowball by Level 9), to a whole host of historical settings as in Eureka by Domark.

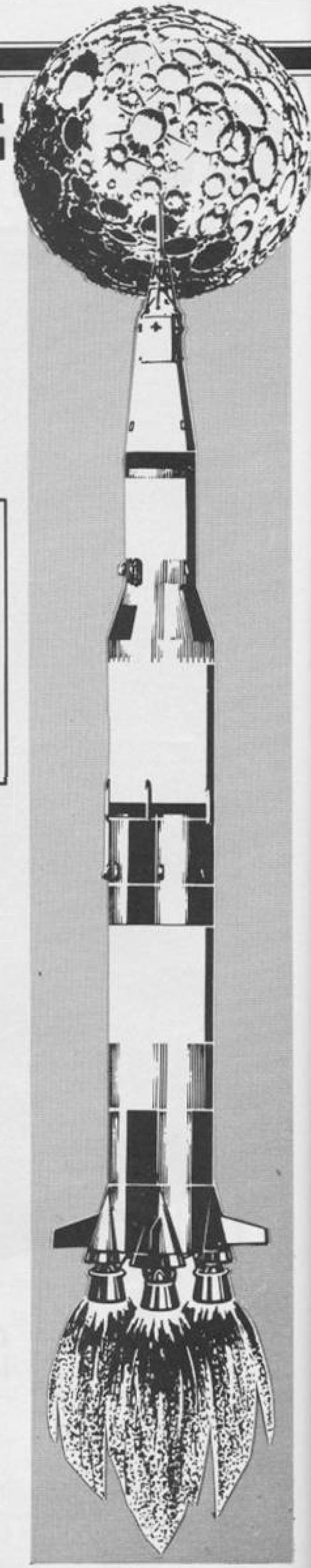
Some are multiple choice, some are Verb/Noun, some have graphics and others have independent character action. There are those with animated graphics, even those which are wholly graphic (and which adventurers of the old school regard as arcade games), those with combinations of two, or even more, of all these features. The list is vast and expanding all the time, this section is intended to try and clear some of the confusion, begin a series for budding adventure writers, and provide listings for you to type in and enjoy.

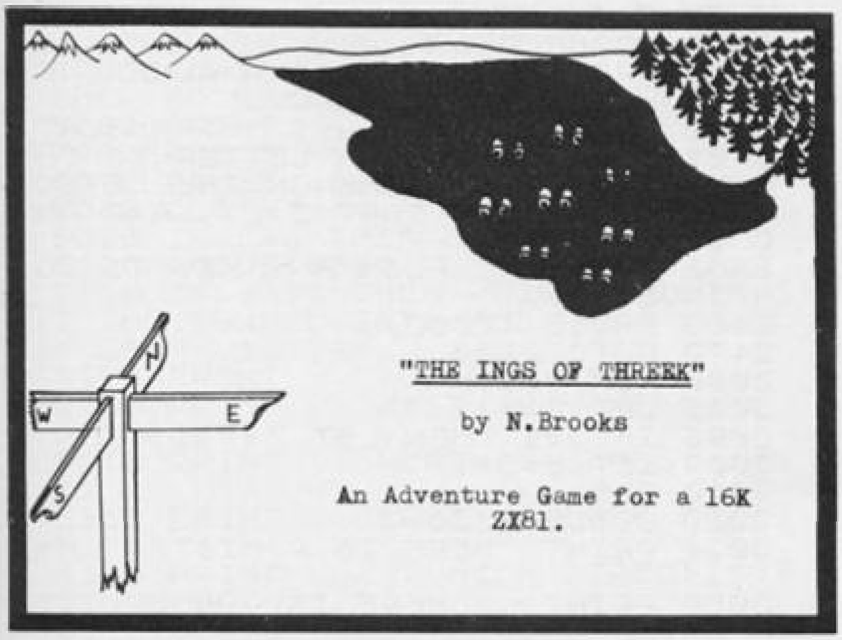
HAPPY HUNTIN'

The Ings of Threek

A unique adventure for the daring ZX81 owner from Norman Brooks in darkest Kent.







You are Captain of the Earthship Adventurer. While patrolling deepest space, you receive news from a Galactic Trader of a new and, as yet, unexplored planet called "ORIEN". Tales abound of a lost planet inhabited by strange creatures called "INGS".

You set course for Orien. . . . . your mission to find them and ask them about their quest in life. (Good Luck)

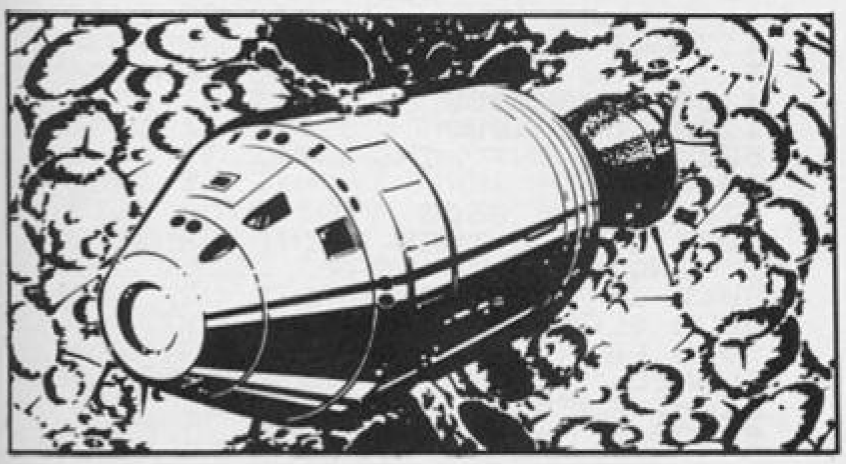
Program notes

LOAD "INGS" and then RUN the program.

The stage is set by offering the above introduction followed by instructions which lay the ground rules. Basically, the idea is to collect KEYWORDS (written in inverse letters) as you progress through the adventure, picking up objects on the way, which may help you to overcome certain obstacles. To say more would defeat the object of the game, and you are left to learn by trial and error. Have fun. . . . .

Major variables

A$ to J$ & M$	— Keywords
K	— Equals 1 if key taken
O	— Equals 1 if box opened
M	— Equals 1 if map taken
D	— Equals 1 if dictionary found
T	— Search Points
E	— Equals 1 when East direction taken
W	— Equals 1 when West direction taken
S	— Equals 1 when South direction taken
N	— Equals 1 when North direction taken
C	— Equals 1 when Cave direction taken
L	— Equals 1 when Lake direction taken
F	— Equals 1 when Forest direction taken
Q	— Equals 1 when Leader found

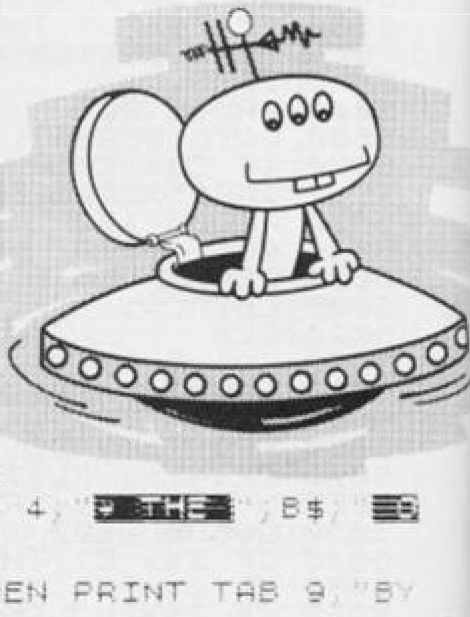


```
  10 REM "INGS"
  15 GOSUB 9000
  20 GOSUB 9500
 100 PRINT "YOU ARE CAPTAIN OF T
HE EARTHSHIPADVENTURER. WHILE PA
TROLLING    DEEPEST SPACE YOU RE
CEIVE NEWS  FROM A GALACTIC TRAD
ER OF A NEW AND, AS YET, UNEXPLO
RED PLANET  ";C$;". TALES ABOUND
 OF A LOST   PLANET INHABITED BY
 STRANGE     CREATURES CALLED ";
B$;"."
 110 PRINT
 120 PRINT "YOU SET COURSE FOR "
;C$;"....YOURMISSION TO FIND THE
M AND ASK    THEM ABOUT THEIR QU
EST IN LIFE."
 130 PRINT
 140 PRINT "PUSH ANY KEY FOR INS
TRUCTIONS..."
 150 PAUSE 40000
 160 CLS
 165 LET Z=1
 170 GOSUB 9500
 200 PRINT "INSTRUCTIONS:-"
 210 PRINT "        YOU PROGRESS T
HROUGH THIS ADVENTURE BY ANSWERI
NG QUESTIONSAS THEY ARE ASKED. O
N YOUR WAY"
 220 PRINT "YOU WILL RECEIVE KEY
 WORDS WHICHARE SIGNIFICANT FOR
COMPLETION  OF THE GAME. THESE A
RE PRINTED  IN INVERSE LETTERS A
ND YOU MAY  LIKE TO JOT THEM DOW
N AS YOU GO."
 240 PRINT "WHEN YOU FINALLY MEE
T THE LEADEROF THE ";B$;" YOU MU
ST TYPE:-"
 245 PRINT
 250 PRINT TAB 13;"""QUEST"""
 255 PRINT
 260 PRINT "       THIS REVEALS THE
 ULTIMATE   SOLUTION TO THE GAME
.(GOOD LUCK)"
 270 PRINT
 280 PRINT "PUSH ANY KEY TO STAR
T........"
 290 PAUSE 40000
 292 CLS
 293 LET T=T+1
 295 GOSUB 9500
 300 PRINT "     YOUR SPACESHIP H
AS LANDED 0N";C$;".        THE ATM
OSPHERE IS   BREATHABLE AND YOU
DISEMBARK."
 310 PRINT " YOU CAN SEE:-"
 320 PRINT
 330 PRINT "NORTH-SNOWY PEAKS ON
 THE HORIZON"
 335 PRINT
 340 PRINT " EAST-HILLS SLOPE TO
WARDS FIELDS         OF WILD GOOSEB
ERRIES."
 350 PRINT
 360 PRINT "SOUTH-SWIRLING MISTS
 HUGGING A           BOGGY MOOR."
 370 PRINT
 380 PRINT " WEST-PATH UPWARDS F
OLLOWING THE         BANK OF A CRYS
TAL STREAM."
 390 PRINT
 400 PRINT "WHICH DIRECTION? (N,
S,E OR W)"
 410 GOSUB 9800
 440 IF Z$="N" THEN GOTO 1000
 450 IF Z$="E" THEN GOTO 2000
 460 IF Z$="S" THEN GOTO 3000
 470 IF Z$="W" THEN GOTO 4000
 480 CLS
 490 GOSUB 9500
```

```
 500 GOTO 310
1000 REM NORTH
1005 LET N=N+1
1010 CLS
1020 GOSUB 9500
1030 PRINT "HERE IS A SHEER CLIF
F FACE"
1040 PRINT ,,"HERE IS DOOR WITH
RUNE MARKINGS"
1042 PRINT ,,"DO YOU WANT TO:-"
1050 PRINT ,,TAB 3;"
"
1060 PRINT TAB 3;"            "
1070 PRINT TAB 3;" YP PARM    "
1080 PRINT TAB 3;" UPI MRRF   "
1090 PRINT TAB 3;"
OPEN?   (O)"
1100 PRINT TAB 3;"1 LRU       "
1110 PRINT TAB 3;"
RETURN? (R)"
1120 PRINT TAB 3;"2 APOMYD=8  "
1130 PRINT TAB 3;"            "
1140 PRINT TAB 3;"3 ASDDEPTF  "
1150 PRINT TAB 3;"            "
1160 PRINT TAB 3;"            "
1170 GOSUB 9800
1200 IF Z$="O" THEN GOTO 8900
1210 IF Z$="R" THEN GOTO 480
1220 GOTO 1000
2000 REM EAST
2005 LET E=E+1
2006 IF E=1 THEN LET T=T+1
2007 LET E=E+1
2010 CLS
2020 GOSUB 9500
2030 PRINT "HERE IS A ";F$;" OF
GOOSEBERRIES."
2040 PRINT
2050 PRINT "HERE IS A HUT"
2055 PRINT
2060 PRINT "DO YOU WANT TO:-"
2070 PRINT
2080 PRINT "ENTER?  (E)",,,"FEA
ST?  (F)",,,,"RETURN? (R)"
2090 GOSUB 9800
2120 IF INKEY$="E" THEN GOTO 220
0
2130 IF INKEY$="R" THEN GOTO 480
2140 IF INKEY$="F" THEN PRINT ,,
TAB 12;"""PIG"""
2145 PAUSE 150
2150 GOTO 2000
2200 REM INSIDE HUT
2210 CLS
2220 GOSUB 9500
2230 GOSUB 8500
2240 IF D=0 THEN PRINT "ONE BOX
IS UNOPENED AND HAS A   LABEL WI
TH RUNES SAYING """HOGY    GTPO YJ
R OMHD""",,,,"DO YOU WANT TO:-"
2245 IF D=1 THEN PRINT "THE LABE
L FROM YOUR OPENED BOX  LIES ON
THE FLOOR."
2250 PRINT ,,"READ?  (R)",,,,"LE
AVE? (L)"
2255 IF D=0 THEN PRINT ,,"OPEN?
 (O)"
2260 GOSUB 9800
2290 IF Z$="O" AND D=0 THEN GOTO
 2400
2300 IF Z$="L" THEN GOTO 2000
2302 IF Z$="R" AND D=0 THEN PRIN
T ,,"IMPOSIBLE WITHOUT A DICTION
ARY."
2305 IF Z$="R" AND D=1 THEN GOTO
 8600
2310 PAUSE 150
2320 GOTO 2200
2400 REM OPEN THE BOX
2410 LET D=1
2420 CLS
2430 GOSUB 9500
2440 PRINT "INSIDE IS A RUNE INT
O ENGLISH   DICTIONARY."
2450 PRINT ,,"IT SAYS ""TRANSLAT
E BY READING   EACH LETTER TO TH
E LEFT OF THE  RUNE ON THE KEYBO
ARD. NOTE ALSO THAT Z=L , A=P AN
D Q=M."""
2462 PRINT ,,"PUSH ANY KEY TO CO
NTINUE....."
2465 PAUSE 40000
2470 GOTO 2200
3000 REM SOUTH
3005 LET S=S+1
3006 IF S=1 THEN LET T=T+1
3007 LET S=S+1
3010 CLS
3020 GOSUB 9500
3030 PRINT "HERE IS A MISTY ";H$
;"."
3050 PRINT ,,"HERE IS A HOLE WIT
H WATER NOISES"
3060 IF K=0 THEN PRINT ,,"HERE I
S A KEY WITH RUNE MARKINGS"
3070 PRINT ,,"DO YOU WANT TO:-"
3080 PRINT ,,"ENTER?  (E)",,,,"S
LEEP?  (S)",,,,"RETURN? (R)"
3085 IF K=0 THEN PRINT ,,"TAKE?
 (T)"
3090 GOSUB 9800
3120 IF Z$="E" THEN GOTO 4000
3140 IF Z$="R" THEN GOTO 480
3150 IF K=0 AND Z$="T" THEN GOTO
 8800
3160 IF Z$="S" THEN PRINT ,,"WHA
T....AND CATCH PNEUMONIA?"
3180 PAUSE 300
3190 GOTO 3000
4000 REM WEST
4005 LET W=W+1
4006 IF W=1 THEN LET T=T+1
4007 LET W=W+1
4010 CLS
4020 GOSUB 9500
4030 PRINT "HERE IS A ";G$;" OF
FORTUNE."
4050 PRINT ,,"HERE IS A MISTY BL
ACK HOLE"
4060 IF M=0 THEN PRINT ,,"HERE I
S A RUNE MAP"
4070 PRINT ,,"DO YOU WANT TO:-"
4080 PRINT ,,"ENTER?  (E)",,,,"D
RINK?  (D)",,,,"RETURN? (R)"
4085 IF M=0 THEN PRINT ,,"TAKE?
 (T)"
4090 GOSUB 9800
4120 IF Z$="E" THEN GOTO 3000
4140 IF Z$="R" THEN GOTO 480
4150 IF M=0 AND Z$="T" THEN GOTO
 8700
4160 IF Z$="D" AND D=0 THEN PRIN
T ,,"THE ";G$;" SAYS ""TO READ T
HE    MAP YOU NEED A DICTIONARY""
"
4170 IF Z$="D" AND D=1 THEN PRIN
T ,,"YOU ARE NO LONGER THIRSTY"
4180 PAUSE 300
4190 GOTO 4000
5000 REM INTO ING LAND
5010 CLS
5020 GOSUB 9500
5030 IF C=0 THEN PRINT "WELL DON
E. ING-LAND IS NEAR....."
5040 IF C=0 THEN PRINT ,,,,"THE
DOOR SLAMS SHUT BEHIND YOU."
5045 PRINT ,,"YOU ARE IN A DARK
TUNNEL.",,,"THERE IS A POINT OF
LIGHT AHEAD."
5050 IF C=0 THEN PRINT ,,,,"  (I
```

```
 HOPE YOU HAVE A NOTE OF THE7 KE
YWORDS (IN ENGLISH).THEY MAYBE O
F USE LATER...THERE ARE MORETO C
OME- SO KEEP YOUR EYES OPEN)"
5060 PRINT ,,,,"PUSH ANY KEY TO
TRAVERSE TUNNEL."
5070 PAUSE 40000
5080 CLS
5090 IF C=0 THEN LET T=T+1
5100 GOSUB 9500
5110 IF C<>1 THEN PRINT "YOU EXI
T THE TUNNEL INTO THE      ""VALLE
Y OF ";J$;""""
5120 PRINT ,,"YOU CAN SEE:-"
5130 PRINT ,,"WEST -A HONEYCOMB
OF CAVES."
5140 PRINT ,,"NORTH-A GLASSY LAK
E."
5150 PRINT ,,"EAST -A DARK FORES
T."
5160 PRINT ,,,,"WHICH DIRECTION?
 (N,E OR W)"
5170 GOSUB 9800
5200 IF Z$="W" THEN GOTO 6000
5210 IF Z$="N" THEN GOTO 6500
5220 IF Z$="E" THEN GOTO 5500
5230 GOTO 5170
5500 REM FOREST
5505 LET F=F+1
5510 CLS
5520 IF F=1 THEN LET T=T+1
5530 GOSUB 9500
5540 PRINT "HERE IS THE ACRID, "
;
5550 IF L=0 THEN PRINT "IMPENETR
ABLE "
5555 IF L<>0 THEN PRINT "INKY BL
ACK "
5560 PRINT "FOREST OF ";A$;"."
5570 PRINT ,,"DO YOU WANT TO:-"
5575 PRINT ,,"ENTER?  (E)",,,,"L
ISTEN? (L)",,,,"RETURN? (R)"
5580 GOSUB 9800
5590 IF Z$="E" AND L<>0 THEN GOT
O 7000
5610 IF Z$="E" AND L=0 THEN GOTO
 5800
5620 IF Z$="R" THEN GOTO 5080
5630 IF Z$="L" THEN PRINT ,,"YOU
 HEAR THE CACKLE OF EXCITED  ALI
EN VOICES."
5640 PAUSE 200
5650 GOTO 5500
5800 IF Z$="E" AND L=0 THEN PRIN
T ,,"IMPOSSIBLE FROM HERE."
5810 PAUSE 150
5820 GOTO 5500
6000 REM CAVES
6005 LET C=1
6020 CLS
6030 GOSUB 9500
6040 PRINT "HERE IS A CAVE ENTRA
NCE."
6050 PRINT ,,"DO YOU WANT TO:-"
6060 PRINT ,,"LISTEN? (L)",,,,"E
NTER?  (E)",,,,"RETURN? (R)"
6070 GOSUB 9800
6075 IF Z$="E" THEN LET C=2
6080 IF Z$="E" THEN GOTO 5000
6085 IF Z$="L" THEN GOTO 6110
6090 IF Z$="R" THEN GOTO 5080
6100 GOTO 6070
6110 PRINT ,,"A MYSTERIOUS HAUNT
ING VOICE SAYS""REMEMBER TO ANSW
ER ""QUEST"" WHEN YOU ARE ASKED
WHAT YOU WANT TO KNOW"""
6120 PAUSE 300
6130 GOTO 6000
6505 LET L=L+1
6510 CLS
6520 IF L=1 THEN LET T=T+1
6530 GOSUB 9500
6540 PRINT "HERE IS THE SOUTH BA
NK OF A      MIRROR-LIKE LAKE MAD
E OF ";D$
6550 PRINT ,,"IT IS FED BY A BLA
CK,PUNGENT    STREAM OOZING FROM
 A FOREST TO  THE EAST."
6560 PRINT ,,"STRANGE BLACK FOOT
PRINTS LEAD     INTO THE FOREST."
6570 PRINT ,,"DO YOU WANT TO:-"
6580 PRINT ,,"FOLLOW? (F)",,,,"S
WIM?   (S)",,,,"RETURN? (R)"
6590 GOSUB 9800
6600 IF Z$="F" THEN GOTO 5500
6610 IF Z$="R" THEN GOTO 5080
6620 IF Z$="S" THEN GOTO 6650
6630 GOTO 6590
6650 PRINT AT 18,13;"EUGGH..WHAT
 A MESS."
6660 PAUSE 150
6670 GOTO 6500
7000 REM INTO FOREST
7001 LET X=0
7002 LET X=X+1
7003 LET Q=Q+1
7005 CLS
7010 GOSUB 9500
7020 PRINT "THE TREES GROW FROM
POOLS OF ";D$
7030 IF X<2 THEN PRINT ,,"SUDDEN
LY YOU ARE SURROUNDED BY   ";B$;"
 WHICH HAVE JUMPED OUT OF    THE
POOLS WHERE THEY LIVE."
7040 PRINT ,,"DO YOU WANT TO:-"
7050 PRINT ,,"FIGHT?  (F)",,,,"S
PEAK?  (S)",,,,"RUN?    (R)"
7060 GOSUB 9800
7065 IF Z$="S" THEN PRINT ,,"YOU
 SAY ""TAKE ME TO YOUR LEADER"""
7070 IF Z$="R" THEN PRINT ,,"YOU
R FEET ARE STUCK IN BITUMEN."
7080 IF Z$="F" THEN PRINT ,,"THE
 ";B$;" HAVE THROWN ";D$;" AT YO
U AND YOU ARE STUCK FAST."
7090 PAUSE 200
7095 IF Z$="S" THEN GOTO 7200
7100 GOTO 7002
7200 CLS
7205 IF Q=1 THEN LET T=T+1
7210 GOSUB 9500
7220 PRINT "YOU ARE TAKEN DEEP I
NTO FOREST."
7230 PRINT ,,"HERE IS A THRONE."
,,,"HERE SEATED IS-",,,,"CAPTAIN
 ";K$;",",,,"THE LEADER OF THE "
;B$;",",,,"AND RULER OF THE VALL
EY OF ";J$;"."
7240 PRINT ,,"HE ASKS....",,,,""
"WHAT DO YOU WANT TO KNOW?"""
7250 INPUT Z$
7260 IF Z$="QUEST" THEN GOTO 750
0
7270 PRINT ,,"""LISTEN TO THE CA
VES..."""
7280 PAUSE 150
7290 GOTO 6000
7500 CLS
7505 LET Y=Y+1
7510 GOSUB 9500
7515 PRINT "THE CAPTAIN SAYS:-"
7520 PRINT ,,"""BEFORE I ANSWER
YOU, TELL ME:-"""
7530 PRINT ,,"       ""THE FIRST K
EY WORD ON THE BOX LABEL. (IN EN
GLISH)"""
7540 INPUT Z$
7550 IF Z$="GIFT" THEN GOTO 8000
7560 PRINT ,,"""";Z$;" IS NOT CO
RRECT"""
```

```
7570 PAUSE 150
7580 IF Y<3 THEN GOTO 7500
7582 CLS
7584 GOSUB 9500
7590 GOTO 8600
7600 PAUSE 150
8000 REM THE ULTIMATE SOLUTION
8005 LET Z=2
8010 CLS
8020 GOSUB 9500
8025 PRINT "THE CAPTAIN NOW REVE
ALS ALL....."
8026 PRINT ,,"HE SAYS:-"
8028 PAUSE 250
8030 PRINT AT 8,0;"WE ";A$;" ";B
$;" FROM ";C$;" ";D$;","
8040 PRINT
8050 PRINT "BEARING ";E$;" WE TR
AVEL AFAR,"
8060 PRINT
8070 PRINT F$;" AND ";G$;","
8080 PRINT
8090 PRINT H$;" AND ";I$;","
8100 PRINT
8110 PRINT "FOLLOWING ";J$;" ";K
$;"."
8120 PAUSE 250
8150 PRINT AT 21,10;"(
)"
8200 FOR R=1 TO 9
8210 IF R/2<>INT (R/2) THEN PRIN
T AT 21,10+R/2;CHR$ (CODE M$(R)+
38)
8220 IF R/2=INT (R/2) THEN PRINT
 AT 21,16+R/2;CHR$ (CODE M$(R)+3
8)
8230 NEXT R
8240 STOP
8500 REM WRAPPINGS
8510 PRINT "HERE IS A PILE OF EM
PTY BOXES,  WRAPPING PAPER AND S
TRING.",,,
8520 RETURN
8600 REM READ LABEL
8604 LET O=O+1
8605 IF O=1 THEN LET T=T+1
8606 IF O=1 THEN PRINT AT 2,23;T
8608 PRINT AT 9,0;,,"LABEL READS
 """[illegible] GTPO YJR OMHD""""
8609 IF K>0 THEN PRINT ,,"YOUR K
EY SAYS ""YJR ASDDEPTF OD     ""A
PODDPM"" """"
8610 IF M>0 THEN PRINT ,,"YOUR M
AP READS ""YJR OMHD ZOBR    NRUPM
F SBTOZ [illegible] YP YJR     MPTYJ
""""
8612 PRINT ,,"PUSH ANY KEY TO CO
NTINUE...."
8615 PAUSE 40000
8620 GOTO 2000
8700 REM TAKE MAP
8705 LET M=M+1
8706 IF M=1 THEN LET T=T+1
8710 CLS
8720 GOSUB 9500
8725 GOSUB 8500
8730 PRINT "THE MAP IS WRITTEN I
N RUNES."
8740 PRINT ,,"IT SAYS:-"
8750 PRINT ,,"     YJR OMHD ZOBR N
RUPMF SBTOZ    SPIMYSOM YP YJR MP
TYJ"
8760 PRINT ,,"PUSH ANY KEY TO CO
NTINUE..."
8770 PAUSE 40000
8780 GOTO 4000
8800 REM TAKE KEY
8805 LET K=K+1
8806 IF K=1 THEN LET T=T+1
8810 CLS
8820 GOSUB 9500
8825 GOSUB 8500
8830 PRINT "THE RUNES ON THE KEY
 ARE:-"
8840 PRINT ,,"    YJR ASDDEPTF OD
 ""APODDPM"""
8860 PRINT ,,"PUSH ANY KEY TO CO
NTINUE..."
8870 PAUSE 40000
8880 GOTO 3000
8900 REM OPEN DOOR
8905 LET P=1
8910 IF K>0 AND T>7 THEN GOTO 89
70
8950 IF K=0 THEN PRINT AT 14,17;
"IMPOSSIBLE    ";AT 16,17;"WITHOU
T A KEY "
8952 IF K>0 AND T<8 THEN PRINT A
T 14,17;"NOT ENOUGH     ";AT 16,1
7;"SEARCH POINTS "
8955 PAUSE 150
8960 GOTO 1000
8970 PRINT AT 14,17;"ENTER THE
    ";AT 16,17;"PASSWORD     "
8972 LET P=P+1
8975 INPUT P$
8980 IF P$="POISSON" THEN GOTO 5
000
8985 IF P<=4 THEN PRINT AT 14,17
;"INCORRECT     ";AT 16,17;"
          "
8986 PAUSE 50
8988 IF P<4 THEN GOTO 8970
8990 GOTO 1000
9000 REM CHR$ STRINGS
9010 LET C$="O[illegible]EN"
9020 LET B$="[illegible]NGS"
9030 LET H$="[illegible]OOR"
9040 LET F$="F[illegible]LD"
9050 LET G$="[illegible]NTAIN"
9060 LET E$="[illegible]TS"
9070 LET I$="[illegible]NTAIN"
9080 LET A$="[illegible]REEK"
9090 LET D$="[illegible]RR"
9100 LET K$="[illegible]RSTAR"
9110 LET J$="[illegible]"
9120 LET M$=" ▌?:):▒"+CHR$ 11+CH
R$ 11
9130 LET K=0
9132 LET C=0
9134 LET F=0
9136 LET L=0
9138 LET Y=0
9139 LET G=0
9140 LET D=0
9141 LET E=0
9142 LET W=0
9143 LET S=0
9144 LET N=0
9145 LET T=1
9146 LET O=0
9147 LET M=0
9148 LET Z=0
9150 RETURN
9500 REM TITLE
9505 PRINT TAB 4;"[illegible] THE [illegible]";B$;"[illegible]
[illegible]";A$;"[illegible]"
9510 PRINT
9520 IF Z=0 THEN PRINT TAB 9;"BY
 N.BROOKS"
9522 IF Z=1 THEN PRINT TAB 7;"SE
ARCH POINTS = ";T
9525 PRINT
9530 RETURN
9800 REM INKEY$
9810 IF INKEY$<>"" THEN GOTO 981
0
9820 IF INKEY$="" THEN GOTO 9820
9830 LET Z$=INKEY$
9840 RETURN
```



CREATING AN ADVENTURE BRAIN

Brian Robb begins a series which will help you to write your own adventures.

When writing an adventure game program, assuming you have created a scenario and drawn a map (for details of this see 'Here Be Dragons' in the Oct/Nov issue), the next stage is to begin programming. The easiest way to construct an adventure game is to write it in a modular fashion, so that each separate module links up to form a completed adventure. In this article I shall concentrate on the main module, the part which controls the adventure — the 'brain' program.

The brian program has to achieve several things to control the adventure. It has to read the data for location descriptions, display this data to the player, and understand the player's input, as well as moving the player around the map. It is best to take these aims one at a time and see how to accomplish them on both the ZX81 and the Spectrum.

First, 'reading' the location data. With a Spectrum this is relatively easy to achieve. First, an area of the program must be set aside to hold the data, and the size of this area will depend on how much memory is available to the user. As an example, I'll use line 9000 as the beginning of the data store in the program which accompanies this article. Figure 1 shows how data is stored using the Spectrum. The first part in the data line is a description of the player's first location (the use of the asterisk symbol shall be explained later), followed by a series of numbers and dashes. These are used in the movement routine which I shall come to later.

It is easy for the Spectrum to access this data using the READ command, the ZX81, unfortunately, lacks the READ and DATA commands, so an alternative system must be used. Figure 2 shows one possible system that can be used in place of READ and DATA. Line 90 is only used at the start of the game to set the player's location number, the variable L, to the value of one. Line 100 is the main line. Depending on the value of L, the program is sent to a different data section where the variable L$ becomes the location description, and D$ the direction data for use in the movement routine. Each individual location description is ten lines apart in the sequence 9000 for location one, 9010 for loction 2, 9020 for location 3, and so on.

Now we know how to store the location description data and the direction data (I'll discuss how they are used later) and how to retrieve it, the brain program must be able to display this information. Figure 3 shows how both the ZX81 and Spectrum print out the player's location. The description is printed out a single letter at a time enabling the player to read along as it is printed. This is where the asterisk comes into action. When the program comes across an asterisk in L$, it begins printing on the next line, preventing words running over the end of the screen. Now I'll move onto how the computer will understand the player's input.

To begin with, a list must be made of the verbs that you will use in the game. The most basic verbs are GO; GET; DROP; INVENTORY; and REDESCRIBE. In a later article I shall consider some more specific verbs. All the verbs must be set up at the beginning of the game. Figure 4 shows how to do this on the Spectrum. Figure 5 is the ZX81 version. How this data is to be accessed shall be shown in a later article. The data is in the form of the verb, V$, and a number, V, which is where the subroutine shall be located in the program. These subroutines and how they are accessed shall be the subject of the next article. In this article however, I shall consider the verb 'GO' which enables movement, and the movement subroutine. Before it can do this though, the computer has to understand the player input, which is usually in the form of a verb followed by a noun, such as 'GO EAST'. Figure 6 shows how the computer understands English. The player is prompted by the question 'What now?', and the player's response is stored in Z$. Line 660-730 perform an operation called string slicing, which means that Z$, 'GO EAST' is split into two words in two different strings — X$ becomes 'GO' and Y$ 'EAST'. I shall go through this section of the program, explaining each in-



dividual line . This is necessary to enable understanding of the program. First line 660 adds a space to the end of the players response Z$, (you'll see why later). Line 670 sets a flag or indicator, Z, to the value of zero. Now we come to the lines which do the work. These are contained within a FOR/NEXT loop, begun in line 680. The length of this loop depends on the length of Z$. Line 690 begins 'IF Z$(I)=" " ', at this point I= one and Z$(I) is therefore the first letter in Z$ — 'G'. So Z$(I) is not equal to a space, and the program jumps to line 700, then 710 and 720. This is because Z$(I) is not equal to an empty space and so ends at line 720.

X$ was defined in line 605 as 'LET X$ = " "'; an empty string. As X$ has not changed line 720 is also passed over. That brings us to line 730 — 'NEXT I', and so the loop begins again. This time I= two and so we are dealing with Z$(2), the letter 'O'. This process continues until Z$(I) is equal to a space, which is when I= three, the space between 'GO' and 'EAST'. This time the computer continues with line 690 — 'AND Z=O'. Z was given the value zero in line 670 and so far remained unchanged, so this is true. Z is set at zero to indicate that X$ (which shall become the first word) is still empty. At last we reach the end of line 690 — 'THEN LET X$ = Z$(1 TO I-1)'. X$ is currently empty and so can be filled with 'Z$(1 TO I-1)'. Z$ is 'GO EAST' and I is currently three, so 'Z$(1 TO I-1)' is the first two letters in Z$ — 'GO'. In this way X$ comes to be the first word 'GO'.

Now the computer moves to line 700 and because the conditions of Z$(I) and Z remain unchanged, jumps to line 720. As X$ now has the value 'GO', then line 720 is no longer passed by and Z becomes one, to indicate X$ is occupied. Line 730 then adds one to the value of I, making it four. As Z$(4) is 'E', the computer goes around in a loop until Z$(I) is again equal to a space, when I= eight. This is the space added to Z$ earlier. Now we see why it is important, because it tells the computer that it has reached the end of another word. Line 690 is ignored because, although Z$(8) is equal to a space, Z is now equal to one. Line 700 is also ignored. The computer now reaches line 710.

Line 710 is carried out because Z$(8) is equal to a space and Z is equal to one. The computer follows the instruction 'THEN LET Y$ = Z$(LEN X$ +2 TO I-1)'. This looks complicated, but I shall explain. Y$ is currently empty and was set up in line 605. Now Y$ is to be given a value as stated in the line. LEN X$, the length of X$, is two, and adding two brings this to four. The value of I-1, I=8, is then 7. This simplifies the instruction to 'LET Y$ =Z$(4 TO 7)'. As Z$ = 'GO EAST', then letters 4 to 7 are the section 'EAST' — and we have the second word.

In this way the computer splits the player's input, Z$, into two individual words, X$ and Y$. This string slicing takes only seconds, though it looks complicated. The system is written for the Spectrum, but is easily used on the ZX81 by changing line 605 into three separate lines. Other than that it can be used as shown in figure 6.

So far I have shown how the brain program reads the location data, prints it on the screen, and how the program splits player input into two words. Finally for this article, as I am dealing with the verb 'GO' I shall consider the final section of the brain program, the movement routine. Figure 7 shows the full movement routine, for use on both the Spectrum and ZX81. This is where D$, the line of numbers and dashes, called the direction string, comes into play. As an example, figures 1 and 2 have shown the direction data string as reading '03--02--'. This shows which direction you can move from your present location and into which room you move. Each of the compass directions, N,S,E,W, are represented by a two digit number (you may add U for up and D for down if your adventure requires it). This number is the location number into which you move if you go in the direction that the number represents. To use the example, if you 'GO NORTH' you enter room 03, so L is given the value 3 and your location description changes. You cannot move south as indicated by the dashes '--', going east leads into room 02, nor can you go west. Figure 7 shows the program lines used to decode the direction data string.

Line 900 puts the player's current location number, L, into the variable L2. Lines 910 onward decode the direction data string. To illustrate this, I'll use the command 'GO EAST'. After being spliced, the computer understands 'GO' and is directed to the movement subroutine (this is done by another routine which I shall explain in the next article).

So, the computer arrives at line 910, which begins 'IF Y$(1)='N''. Y$ is the second word 'EAST', so Y$(1) is equal to 'E'. The computer jumps past lines 910, 920 and comes to line 930, as the conditions are not met. At line 930 Y$(1) is equal to 'E' and so the computer continues that line. It comes to 'AND D$(5 TO 6)≠ (not equal to) "--". As the location number is one, then the value of D$(5 TO 6) is '02' and so is not equal to '--'. The values for D$ are different at each location depending on your individual map. The computer now reaches the last section of the line 'THEN LET L=VAL D$(5 TO 6)'. This changes the player's location to that held in the numerical value of going east — 02. So L becomes equal to 2. Line 990 checks to see that L has changed from its original value held in L2. If they are equal then the player has tried to move in a direction where there is no exit. The last line returns the program to line 100 where the new location description is read and printed on the screen for the player to read. In this way the program interacts with the player.

If all the individual listings accompanying this article are put together you will have a sample adventure brain, and hopefully understand how it works. However this is not a completed adventure. In the next article I shall consider further subroutines needed to build the brain into a finished adventure.

FIGURE 1: THE SPECTRUM DATA STORE

```
9000    DATA "In a dark room * You can see light to
        the east"; "03__02__"
```

The other lines of location descriptions and direction data strings would follow.

FIGURE 2: THE ZX81 DATA STORE

```
90      LET L=1
100     GOSUB 8990+(L*10)
9000    LET L$="IN A DARK ROOM*YOU CAN SEE
        LIGHT TO THE EAST"
9010    LET D$="03__02__"
9020    RETURN
```

The same pattern is followed for the other location descriptions.

FIGURE 3: DISPLAYING DATA ON BOTH ZX81 AND SPECTRUM

```
150     CLS
200     PRINT "YOU ARE ";
210     FOR N=1 TO LEN L$
220     IF L$(N)="*"THEN PRINT
230     IF L$(N)="*"THEN LET N=N+1
240     PRINT L$(N);
250     NEXT N
260     IF D$="STOP" THEN GOTO 7000
```

(D$ = "STOP" when the player is killed, this shall be explained in a later article).

FIGURE 4: SPECTRUM VERB SET UP

```
8000    DATA "GO", 1000, "GET", 2000, "DROP",
        3000, "INVENTORY", 4000,
        "REDESCRIBE", 5000 (and so on for other
        verbs)
```

FIGURE 5: ZX81 VERB SET UP

```
8000   DIM V$ (m,n) where m is the number of verbs
       and n is the length of the longest
8010   DIM V(m)
8020   LET V$(1) = "GO"
8025   LET V(1) = 1000
8030   LET V$(2) = "GET"
8035   LET V(2) = 2000 (and so on for all the verbs)
```

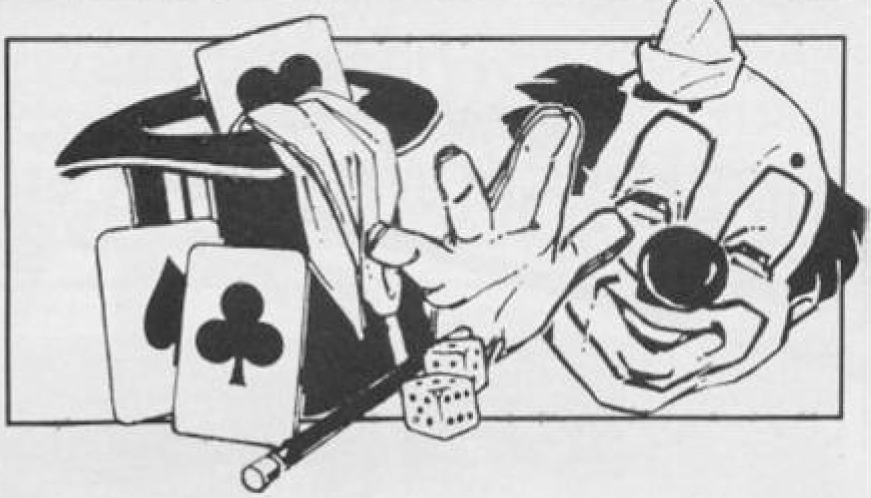


FIGURE 6: STRING SLICING

```
600    PRINT "WHAT NOW?"
605    LET Z$ = "":LET X$ = "": LET Y$ = ""
610    LET F$ = ""
620    PRINT
630    INPUT Z$
640    PRINT"_";Z$
650    PRINT
660    LET Z$ = Z$ + FF$
670    ELT Z = 0
680    FOR I = 1 TO LEN Z$
690    IF Z$(I) = "" AND Z = 0 THEN LET X$ = Z$(1
       TO I-1)
700    IF Z$(I) = "" AND Z = 1 THEN LET Y$ = Z$(LEN
       X$ + 2 TO I-1)
720    IF X$  (not equal to)"" THEN LET Z = 1
730    NEXT I
```

FIGURE 7: MOVEMENT ROUTINE

```
900    LET L2 = L
910    IF Y$(1) = "N" AND D$(TO 2) ≠"_" THEN
       LET L = VAL D$(TO 2)
920    IF Y$(1) = "S" AND D$(3 TO 4) ≠"_" THEN
       LET L = VAL D$(3 TO 4)
930    IF Y$(1) = "E" AND D$(5 TO 6) ≠"_" THEN
       LET L = VAL D$(5 TO 6)
940    IF Y$(1) = "W" AND D$(7 TO 8) ≠"_" THEN
       LET L = VAL D$(7 TO 8)
       (U and D can be added here for up and down)
990    IF L = L2 THEN PRINT "YOU CANT GO THAT
       WAY"
995    GOTO 100
```

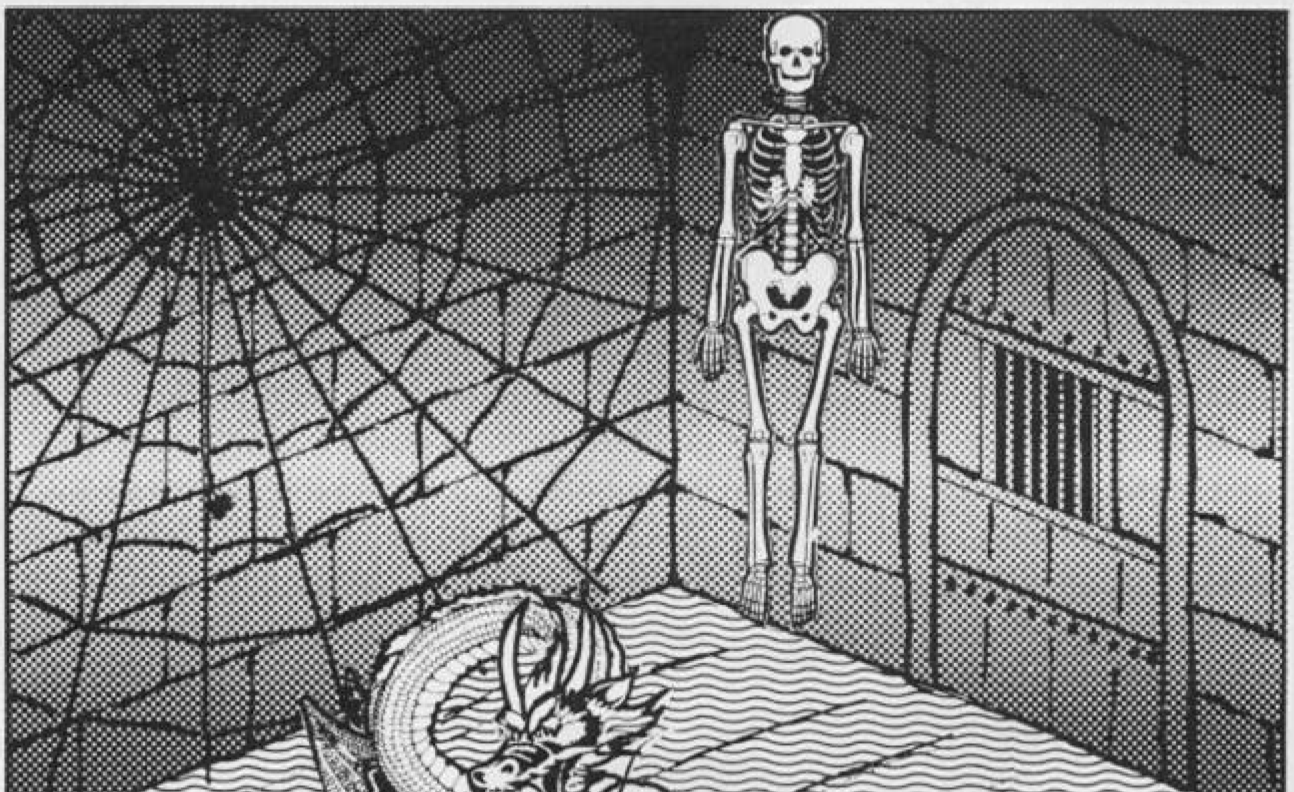


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HOW DOES IT RATE?



A full adventure specially written for ZXC by Alan Davis, author of Temptation Software's 'The Journey'





DUNGEON

Anyone familiar with that marvellous program "The Hobbit" will be aware of the features that set it apart from traditional adventure games. Even setting aside the graphics, and the fact that it is based upon a masterpiece of imaginative fiction, one finds a curious vitality in the game due to the independence of the characters in it, and one's ability to communicate with them. "Dungeon" is an attempt to introduce (in a limited way) independent action into a short text adventure. The game is written entirely in BASIC, but in practice has a fairly respectable response time — largely because the vocabulary is fairly small, but also because the most commonly used subroutines are places early in the program. The most imnortant of these are described below.

Movement routine (Lines 200-290). Permitted moves are stored in the array r(13,6) — 13 locations, and 6 possible directions of movement. Lines 205 to 230 check the legitimacy of a move and execute it. The following lines print the description of the new location, any visible objects, and the new set of permitted movements.

Decode input routine (lines 500-540). This decodes the input string z$ into a maximum of four separate words and stores these as the strings a$, b$, c$, and d$. Four word decoding is necessary for instructions such as "tell jailer drop spoon", or "give spoon to jailer".

Main input routine (lines 100-190). The input is tested against the program's vocabulary. Note that the vocabulary is listed in data statements: verbs at line 25, portable objects at line 30, characters at line 35, and non-portable objects at line 40. a$ is tested against the verbs, and b$ against the nouns, and the appropriate subroutine called for that verb (line 160). If a$ = "tell", and b$ corresponds to a character present at that location, then the strings c$ and d$ are called and the test procedure repeated on the character's behalf.

Independent action routine (lines 700-900) Lines 700 to 722 select a character at random and check to determine whether he is in the present location. (This is in fact done twice in order to make action more likely.) The following lines then select the appropriate action, governed mostly by the RND function, but also in some cases by the charm of the player, or the strength of the character.

Charm and strength The player's strength is registered in the variable t, and the strength of the 3 characters in the array t(3). His charm varies from one character to another, and is held in the array k(3). Note the effect of this on the likelihood of a character co-operating with the player (line 330, called at line 1117).

The game

You may tell the characters to do anything you can do, except move between locations. The hobbit will in any case tend to follow you around, once released. The jailer moves of his own accord between the dungeons and the guardroom. There are a number of ways of increasing a character's affection for you — you could, for example, give him something he wants. The response of the character (or lack of it!) to your actions will usually indicate whether you're on the right track. Combat is inadvisable unless your strength is high and/or you are properly equipped. Most of the objects that turn up are useful. Assuming that you don't cheat by reading the listing too carefully, you may require clues. These may be had by typing "help" — *most* of the hints are helpful. . .

Finally — there is no single solution to the game, since the behaviour of the other characters may either help or hinder you at any time. This can become rather frustrating. . . ▶



```
1 CLS : PRINT AT 8,12;"DUNGEON"
2 POKE 23609,25
5 DIM r(13,6): DIM o(10): DIM k(3): DIM t(3): DIM p(3): GO SUB 9950
10 LET sc=0: LET pushme=0: LET pusdwa=0: LET free=0: LET move=0: LET ill=0: LET hole=0: LET wake=0: LET file=0: LET t=0: LET ring=0: LET slab=0: LET p$="": LET tell=0: LET end=0: LET r=1: LET no=0
25 DATA "tell","get","take","examine","open","close","push","pull","sweep","eat","drink","file","give","drop","fight","dig","scrape","scratch","quit","help","wait","list","score"
30 DATA "plate","crust","broom","file","key","dagger","bottle","spoon","knife","ruby"
35 DATA "jailer","guard","dwarf"
40 DATA "door","chest","trapdoor","chains","window","slab","sand","floor","shelf","mead","boulder","ring","hinges","cement"
50 GO TO 9500
78 LET z$="1": GO SUB 200
80 IF RND<.6 AND r=1 AND p(1)=2 THEN PRINT '"The jailer enters.": LET p(1)=1
85 GO SUB 700
99 REM input routine
100 LET ill=0: LET move=0: LET tell=0: LET end=0: BEEP .1,35: INPUT "WHAT DO YOU WISH TO DO?", LINE z$: IF z$="" THEN GO TO 100
105 GO SUB 200: IF move OR ill THEN GO TO 80
110 GO SUB 500
120 IF tell THEN LET end=1
122 RESTORE 25: FOR v=1 TO 23: READ v$
124 IF (v>=19 OR v=13) AND v$=a$ THEN GO TO 160
125 IF v$=a$ THEN GO TO 140
130 NEXT v
135 PRINT '"I don't " AND NOT tell;"He doesn't " AND tell;"understand.": GO TO 100
140 IF LEN b$<3 THEN GO TO 155
142 RESTORE 30: FOR n=1 TO 27: READ n$
```

```
 145 IF b$( TO 3)=n$( TO 3) THEN
  GO TO 160
 150 NEXT n
 155 PRINT '"I don't " AND NOT t
ell;"He doesn't " AND tell;"unde
rstand what"'"to ";a$: GO TO 100
 160 GO SUB 1000+100*v
 165 IF tell AND NOT end THEN  G
O TO 120
 190 GO TO 80
 200 IF LEN z$<>1 THEN  RETURN
 205 IF z$="n" AND r(r,1) THEN
PRINT '"You go north.": LET r=r(
r,1): LET move=1
 210 IF z$="s" AND r(r,2) THEN
PRINT '"You go south.": LET r=r(
r,2): LET move=1
 215 IF z$="e" AND r(r,3) THEN
PRINT '"You go east.": LET r=r(r
,3): LET move=1
 220 IF z$="w" AND r(r,4) THEN
PRINT '"You go west.": LET r=r(r
,4): LET move=1
 225 IF z$="u" AND r(r,5) THEN
PRINT '"You go up.": LET r=r(r,5
): LET move=1
 230 IF z$="d" AND r(r,6) THEN
PRINT '"You go down.": LET r=r(r
,6): LET move=1
 235 IF z$="l" THEN  LET ill=1
 240 IF move OR ill THEN  CLS :
GO SUB 6000+20*r: GO TO 250
 245 PRINT '"You can't go that w
ay.": LET ill=1: RETURN
 250 PRINT '"You see:"
 255 LET print=0: RESTORE 30: FO
R i=1 TO 10: READ o$: IF o(i)=r
THEN  PRINT "      a ";o$: LET p
rint=1
 257 NEXT i
 260 RESTORE 35: FOR i=1 TO 3: R
EAD p$: IF p(i)=r THEN  PRINT "
     a ";p$: LET print=1
 261 IF p(i)=20+r THEN  PRINT "
     a dead ";p$: LET print=1
 262 NEXT i
 264 IF NOT print THEN  PRINT "
     nothing.": LET print=0
 265 LET print=0:  PRINT "You ma
y go:"
 270 IF r(r,1) THEN  PRINT "nort
h ";: LET print=1
 271 IF r(r,2) THEN  PRINT "sout
h ";: LET print=1
 272 IF r(r,3) THEN  PRINT "east
 ";: LET print=1
 273 IF r(r,4) THEN  PRINT "west
 ";: LET print=1
 274 IF r(r,5) THEN  PRINT "up "
;: LET print=1
 275 IF r(r,6) THEN  PRINT "down
 ";: LET print=1
 276 IF NOT print THEN  PRINT "n
owhere."
 280 IF p(3)=17 OR p(3)>20 THEN
RETURN
 285 IF move AND RND*10<k(3) AND
 p(3)<>r THEN  PRINT '"The dwarf
 enters.": LET p(3)=r
 290 RETURN
 300 PRINT '"You" AND NOT tell;"
He" AND tell;" can't.": RETURN
 310 PRINT '"You" AND NOT tell;"
The " AND tell;p$ AND tell;" ";v
$;"s" AND tell;" the ";n$: RETUR
N
 320 PRINT '"It's not here." AND
 NOT tell;"The " AND tell;p$ AND
 tell;" can't find it." AND tell
 : RETURN
 330 LET no=0: IF 10*RND>k(x) TH
EN  PRINT '"The ";p$;" refuses."
 : LET no=1
 335 RETURN
 340 PRINT '"You don't" AND NOT
tell;"The " AND tell;p$ AND tell
;" doesn't" AND tell;" have it."
 : RETURN
 350 IF tell THEN  PRINT '"The "
;p$;" says:": RETURN
 355 RETURN
 360 PRINT "There's nothing to "
;v$;" with.": RETURN
 370 PRINT '"The dwarf says:": R
ETURN
 500 LET x=0: LET a$="": LET b$=
"": LET c$="": LET d$="": DIM a(
3)
 505 PRINT ' PAPER 6;"+++ ";z$
 508 FOR i=1 TO LEN z$
 510 IF z$(i)=" " THEN  LET x=x+
1
 512 IF x>3 THEN  PRINT '"What?"
 : RETURN
 515 IF z$(i)=" " THEN  LET a(x)
=i-1
 520 NEXT i
 525 IF NOT x THEN  LET a$=z$: R
ETURN
 530 LET a$=z$( TO a(1)): IF x=1
 THEN  LET b$=z$(a(1)+2 TO ): RE
TURN
 535 LET b$=z$(a(1)+2 TO a(2)):
IF x=2 THEN  LET c$=z$(a(2)+2 TO
 ): RETURN
 540 LET c$=z$(a(2)+2 TO a(3)):
```



```
LET d$=z$(a(3)+2 TO ): RETURN
 699 REM Independent action
 700 LET run=0: IF RND<.1 AND p(
1)=1 AND r=1 THEN  PRINT '"The j
ailer leaves.": LET p(1)=2: IF o
(2) AND o(2)<>r THEN  LET o(2)=1
4
 705 IF r=1 AND p(1)<>1 THEN  RE
TURN
 710 RESTORE 35: LET rnd=1+INT (
RND*3): FOR x=1 TO rnd: READ p$:
 NEXT x
 711 LET run=run+1
 715 LET x=x-1
 720 IF p(x)<>r AND run=1 THEN
GO TO 710
 722 IF p(x)<>r THEN  RETURN
 725 IF x=2 AND NOT wake THEN  L
ET wake=1: PRINT '"The guard wak
es up.": RETURN
 726 IF NOT wake AND x=2 THEN  R
ETURN
 730 RESTORE 30: LET rnd=1+INT (
RND*10): FOR y=1 TO rnd: READ o$
: NEXT y
 735 LET y=y-1
 740 IF o(y)=r THEN  PRINT '"The
";p$;" takes the ";o$: LET o(y)
=13+x: RETURN
 745 IF NOT o(y) THEN  PRINT '"T
he ";p$;" takes the ";o$;'"from
you.": LET o(y)=13+x: RETURN
 750 IF o(y)=13+x THEN  PRINT '"
The ";p$;" drops a ";o$: LET o(y
)=r: RETURN
 760 IF wake AND r=2 AND NOT k(2
) AND x=2 AND RND<.5 THEN  PRINT
 '"The guard captures you.": PAU
SE 100: LET r=1: CLS : GO SUB 60
20: LET r(1,4)=0: LET r(1,6)=0:
LET hole=0: LET slab=0: LET r(1,
2)=0: RETURN
 762 LET act=INT (RND*5)
 763 IF x<>3 THEN  GO TO 785
 764 IF NOT act AND o(2)=13+x TH
EN  PRINT '"The dwarf eats a cru
st.": LET t(3)=t(3)+1: LET o(2)=
3: RETURN
 765 IF act=1 AND x=3 AND t(3)<1
0 THEN  GO SUB 370: PRINT "Is it
 time for lunch yet?": RETURN
 770 IF act=2 AND x=3 THEN  GO S
UB 370: PRINT "I wonder what Bag
no Bilbins      would have done i
n these"'"circumstances?": RETUR
N
 775 IF act=3 AND x=3 THEN  GO S
UB 370: PRINT "Shall I sing abou
t g...?"'"No - better not!!": RE
TURN
 780 IF act=4 AND x=3 THEN  GO S
UB 370: PRINT "What's that in th
e corner over"'"there?": RETURN
 783 RETURN
 785 IF act=1 AND o(3)=13+x THEN
 PRINT '"The ";p$;" sweeps the
floor.": RETURN
 790 IF act=2 AND o(2)=13+x THEN
 PRINT '"The ";p$;" eats a crus
t.": LET o(2)=3: LET t(x)=t(x)+1
: RETURN
 795 IF act=3 THEN  PRINT '"The
";p$;" hums a tune.": RETURN
 800 IF act=4 AND k(x)<5 THEN  P
RINT '"The ";p$;" hits you.": LE
T t=t-1 AND t: RETURN
 900 RETURN
1099 REM ** TELL
1100 RESTORE 35: FOR x=1 TO 3: R
EAD p$: IF p$=b$ THEN  GO TO 111
5
1105 NEXT x
1110 PRINT '"You can't talk to t
he ";b$;'"DO try to be sensible!
": RETURN
1115 IF x=3 AND p(x)=17 AND r=9
THEN  PRINT '"He's too preoccupi
ed to listen.": RETURN
1116 IF p(x)<>r THEN  PRINT '"Th
e ";b$;" isn't here.": RETURN
1117 GO SUB 330: IF no THEN  RET
URN
1120 LET a$=c$: LET b$=d$: LET t
ell=1: LET c$="": LET d$="": RET
```

```
URN
1199 REM ** GET
12ØØ IF tell THEN  GO SUB 33Ø: I
F no THEN  RETURN
12Ø5 IF n>1Ø THEN  GO SUB 3ØØ: R
ETURN
121Ø IF o(n)=r AND tell THEN  LE
T o(n)=13+x: GO SUB 31Ø: RETURN
1215 IF o(n)=r AND NOT tell THEN
 LET o(n)=Ø: GO SUB 31Ø: RETURN

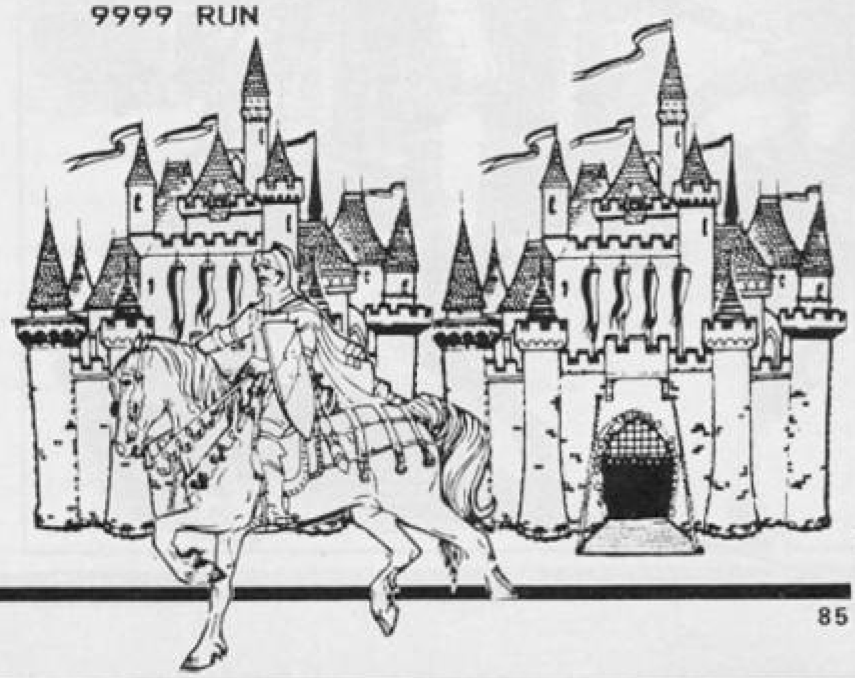
122Ø GO SUB 32Ø: RETURN
1299 REM ** TAKE
13ØØ LET v=2: GO SUB 12ØØ: RETUR
N
1399 REM ** EXAMINE
14ØØ IF n>1Ø THEN  GO TO 142Ø
14Ø5 IF (tell AND o(n)<>13+x) OR
 (NOT tell AND o(n)) THEN  GO SU
B 34Ø: RETURN
141Ø IF n=7 THEN  GO SUB 35Ø: PR
INT '"It's a bottle of mead.": R
ETURN
1415 PRINT '"The " AND tell;p$ A
ND tell;"You" AND NOT tell;" can
't see anything"'"special about
it.": RETURN
142Ø IF r=9 AND (n=14 OR n=26) T
HEN  GO SUB 35Ø: PRINT '"The hin
ges are old and rusty.": RETURN
1425 IF r=1 AND n=18 THEN  GO SU
B 35Ø: PRINT '"On the other side
 of the door"'"you can see the g
uardroom."'"The guard is asleep.
" AND NOT wake: RETURN
143Ø IF NOT slab AND r=1 AND n=1
9 AND RND>.5 THEN  GO SUB 35Ø: P
RINT '"There's nothing special a
bout"'"this slab.": RETURN
1435 IF r=1 AND n=19 THEN  PRINT
 '"This one might be moveable."'
"Some of the cement has fallen"'
"away.": LET slab=1: RETURN
144Ø IF r=1 AND n=21 AND ring TH
EN  GO SUB 35Ø: PRINT '"The top
of an iron ring is"'"sticking ou
t of the sand.": RETURN
1445 IF r=3 AND n=22 AND o(4)=17
 AND o(2) THEN  GO SUB 35Ø: PRIN
T '"There's a file and a crust o
n"'"the shelf.": LET o(4)=3: LET
 o(2)=3: RETURN
1447 IF r=3 AND n=22 AND (o(4)=1
7 OR o(4)=3) AND NOT o(2) THEN
GO SUB 35Ø: PRINT '"There's a fi
le on the shelf.": LET o(4)=3: R
ETURN
1448 IF r=3 AND n=22 AND t+t(3)<
=1Ø AND o(4)<>17 AND o(2)=17 THE
N  GO SUB 35Ø: PRINT '"There's a
 crust on the shelf.": LET o(2)=
3: RETURN
145Ø IF r=1 AND n=25 AND ring TH
EN  GO SUB 35Ø: PRINT '"It seems
 to be fixed to"'"something.": R
ETURN
149Ø GO SUB 1415: RETURN
1499 REM ** OPEN
15ØØ IF r=1 AND p(1)=r AND NOT r
(r,2) AND tell THEN  GO SUB 31Ø:
 LET r(r,2)=2: RETURN
15Ø5 IF r=3 AND n=16 AND NOT r(3
,6) AND (t>=4 OR (tell AND x=3 A
ND t(3)>=4)) THEN  GO SUB 31Ø: L
ET r(3,6)=4: LET r(4,5)=3: LET s
c=sc+1Ø: RETURN
151Ø IF r=3 AND n=15 AND (NOT o(
5) OR (tell AND o(5)=13+x)) AND
o(7)=17 THEN  GO SUB 31Ø: PRINT
'"It contains a bottle.": LET o(
7)=3: LET sc=sc+1Ø: RETURN
152Ø IF tell AND x=2 AND n=14 AN
D k(2)>=1Ø AND r=2 THEN  PRINT '
"The guard goes up the steps.":
LET sc=sc+1Ø: LET p(2)=11: LET r
(11,2)=12: RETURN
158Ø IF r=3 AND n=16 AND (t<4 OR
 (tell AND x=3 AND t(3)<4)) THEN
  GO SUB 3ØØ: PRINT "It needs md
re strength.": RETURN
159Ø GO SUB 3ØØ: RETURN
1599 REM ** CLOSE
16ØØ GO SUB 3ØØ: RETURN
1699 REM ** PUSH
17ØØ IF free AND r=1 AND NOT r(1
,4) AND n=19 THEN  GO SUB 31Ø: P
RINT '"The slab moves, revealing
 a"'"narrow tunnel leading west.
": LET sc=sc+1Ø: LET r(1,4)=7: R
ETURN
17Ø5 IF r=1Ø AND r(1Ø,2) THEN  G
O TO 179Ø
171Ø IF r=1Ø AND n=24 AND NOT te
ll AND t>=4 THEN  GO SUB 31Ø: LE
T pushme=1: GO TO 175Ø
1715 IF r=1Ø AND n=24 AND tell A
ND x=3 AND t(x)>=4 THEN  LET pus
dwa=1: GO SUB 31Ø: GO TO 175Ø
174Ø GO TO 179Ø
175Ø IF pushme AND pusdwa AND NO
T r(1Ø,2) THEN  PRINT '"The boul
der rolls aside.": LET sc=sc+1Ø:
 LET r(1Ø,2)=11: LET r(11,1)=1Ø:
 PRINT '"The dwarf says:" AND p(
3)=1Ø AND o(1Ø)=17;'"Good heaven
s! Look at this!" AND p(3)=1Ø AN
```

```
D o(10)=17: LET o(10)=10: RETURN
1755 IF pushme  OR pusdwa THEN
PRINT '"The boulder wobbles a bi
t.": RETURN
1790 PRINT '"Nothing happens.":
RETURN
1799 REM ** PULL
1800 IF r=1 AND o(6)=17 AND ring
 AND n=25 AND ((t>4 AND NOT tell
) OR (t(x)>4 AND tell)) THEN  GO
 SUB 310: LET sc=sc+10: LET o(6)
=1: PRINT '" The ring is attache
d to a lid"'"which is now open,
revealing"'"a secret cache."'"In
 the cache is a dagger.": RETURN
1810 GO SUB 300: RETURN
1899 REM ** SWEEP
1900 IF n<>21 THEN  GO SUB 300:
RETURN
1905 IF (o(3) AND NOT tell) OR (
tell AND o(3)<>13+x) THEN  PRINT
 '"What with?": RETURN
1910 GO SUB 310
1915 IF NOT tell AND p(1)=r AND
k(1)<5 THEN  PRINT '"The jailer
thanks you for your"'"help and s
uggests that you keep"'"up the g
ood work!": LET k(1)=k(1)+2
1920 IF NOT ring AND RND>.65 THE
N  PRINT '"As you sweep, you unc
over"'" something unusual on the
 floor.": LET ring=1: LET sc=sc+
10
1925 RETURN
1999 REM ** EAT
2000 IF n<>2 THEN  PRINT '"What
curious eating habits!!": GO SUB
 300: RETURN
2005 IF (o(n) AND NOT tell) OR (
tell AND o(n)<>13+x) THEN  GO SU
B 340: RETURN
2010 GO SUB 310: LET o(n)=17: IF
 NOT tell THEN  LET t=t+1: PRINT
 "You feel a little better.": RE
TURN
2015 LET t(x)=t(x)+1: GO SUB 350
: PRINT "I never realised these
crusts"'"were so nourishing!": R
ETURN
2099 REM ** DRINK
2100 IF n<>23 THEN  GO SUB 300:
RETURN
2105 IF (o(7) AND NOT tell) OR (
tell AND o(7)<>13+x) THEN  GO SU
B 340: RETURN
2110 PRINT '"You " AND NOT tell;
"The " AND tell;p$ AND tell;" "
AND tell;v$;"s" AND tell;" some
";n$
2115 IF tell THEN  LET t(x)=t(x)
+3: PRINT "The ";p$;" feels bett
er.": RETURN
2120 IF t<9 THEN  PRINT '"That d
id you good!": LET t=t+3
2125 RETURN
2199 REM ** FILE
2200 IF (o(4) AND NOT tell) OR (
o(4)<>13+x AND tell) THEN  GO SU
B 360: RETURN
2205 IF NOT o(4) AND NOT file AN
D r=9 AND n=17 AND p(3)=17 THEN
 GO SUB 310: PRINT '"The ";n$;"
are made of very hard"'"iron, bu
t you make progress.": LET file=
1: RETURN
2210 IF r=9 AND n=17 AND p(3)=17
 THEN  GO SUB 310: PRINT '"The d
warf is free!": LET sc=sc+10: LE
T p(3)=9: LET k(3)=6: RETURN
2215 IF r=9 AND n=26 AND ((NOT o
(4) AND NOT tell) OR (tell AND o
(4)=13+x)) THEN  GO SUB 310: PRI
NT '"The hinges collapse and the
 door"'"sags open.": LET r(9,4)=
10: RETURN
2250 PRINT '"You manage to scrat
ch it a bit.": RETURN
2299 REM ** GIVE
2300 IF tell THEN  PRINT '"Due t
o the incompetence of the  progr
ammer the ";p$;" is unable"'"to
give things.....": RETURN
2302 RESTORE 30: FOR n=1 TO 10:
READ n$: IF n$=b$ THEN  GO TO 23
20
2305 NEXT n: PRINT '"I don't und
erstand what you're"'"trying to
give.": RETURN
2320 IF o(n) THEN  GO SUB 340: R
ETURN
2325 RESTORE 35: FOR x=1 TO 3: R
EAD p$: IF p$=c$ OR p$=d$ THEN
GO TO 2340
2330 NEXT x: PRINT '"I don't und
erstand who you want"'"to give i
t to.": RETURN
2340 IF p(x)<>r THEN  PRINT '"He
's not here.": RETURN
2345 PRINT '"You give the ";b$;"
 to the"';p$: LET o(n)=13+x: PRI
NT '"The ";p$;" says:"'"I'm much
 obliged to you." AND (n=10 OR n
=7 OR (n=2 AND x=3));"nothing" A
ND n<>10 AND n<>7 AND NOT (n=2 A
```

```
ND x=3)
2350 IF n=10 THEN  LET k(x)=10
2352 IF n=7 THEN  LET k(x)=k(x)+
2
2354 IF n=2 AND x=3 THEN  LET k(
x)=k(x)+1
2360 RETURN
2399 REM ** DROP
2400 IF n>10 THEN  GO SUB 340: R
ETURN
2401 IF (o(n) AND NOT tell) OR (
tell AND o(n)<>13+x) THEN  GO SU
B 340: RETURN
2405 GO SUB 310: LET o(n)=r: RET
URN
2499 REM ** FIGHT
2500 IF tell THEN  GO TO 2550
2501 RESTORE 35: FOR x=1 TO 3: R
EAD p$: IF p$=b$ THEN  GO TO 250
4
2502 NEXT x
2503 GO SUB 300: RETURN
2504 IF p(x)<>r THEN  PRINT '"He
's not here.": RETURN
2505 PRINT '"You ";v$;" the ";p$
: LET k(x)=k(x)-5: LET myscore=t
+(2 AND NOT o(9))+(5 AND NOT o(6
))+INT (RND*6)
2510 LET hisscore=t(x)+(2 AND o(
9)=13+x)+(5 AND o(6)=13+x)+INT (
RND*6)
2515 LET result=myscore-hisscore
2520 IF SGN result=1 THEN  PRINT
 '"You have defeated him.": LET
t(x)=t(x)-result: IF t(x)<0 THEN
  LET p(x)=20+r: PRINT "He's dea
d!!": FOR i=1 TO 10: IF o(i)=13+
x THEN  LET o(x)=r
2522 IF p(x)=20+r THEN  NEXT i
2525 IF SGN result=-1 THEN  PRIN
T '"You are defeated.": LET t=t-
ABS result: IF t<0 THEN  PRINT '
"You've been killed!.": GO TO 99
98
2530 IF SGN result=0 THEN  PRINT
 '"The fight is drawn.": IF t>0
THEN  LET t=t-1: RETURN
2535 RETURN
2550 PRINT '"The ";p$;" prefers
a quiet life."'"He refuses.": RE
TURN
2599 REM ** DIG
2600 IF n<>20 AND n<>21 THEN  GO
 SUB 300: RETURN
2601 IF r<>1 THEN  GO SUB 300: R
ETURN
2605 IF (o(8) AND NOT tell) OR (
tell AND o(8)<>13+x) THEN  GO SU
B 350: GO SUB 360: RETURN
2610 IF NOT hole THEN  PRINT '"T
here is now a hole in the floor"
: LET hole=1: RETURN
2615 IF hole=1 THEN  PRINT '"The
re's a bigger hole now!": PAUSE
100: PRINT '"The bottom of the h
ole collapses"'"into a passage b
elow.": LET sc=sc+10: LET r(1,6)
=7: LET r(7,5)=1: LET hole=2: RE
TURN
2620 IF hole=2 THEN  PRINT '"The
re's another hole now!": RETURN
2690 RETURN
2699 REM ** SCRAPE
2799 REM ** SCRATCH
2800 IF (o(9) AND NOT tell) OR (
o(9)<>13+x AND tell) THEN  GO SU
B 360: RETURN
2805 IF n<>27 THEN  GO SUB 310:
PRINT '"It has no significant ef
fect.": RETURN
2810 GO SUB 310: PRINT "The ceme
nt falls away.": LET free=1: RET
URN
2899 REM quit
2900 RUN
2999 REM ** HELP
3000 PRINT '"You could try overp
owering the  jailer." AND r=1;"D
on't disturb him!" AND NOT wake
AND r=2;"You'd better open the c
hest." AND r=3;"Drop something."
 AND r=4;
3005 PRINT "Equipment is needed.
" AND p(3)=17 AND r=9;"Push it."
 AND r=10 AND r(10,2)=0;"The gua
rd knows how to open it." AND r=
11
3010 PRINT "Can't help you here.
 Sorry!" AND (r=5 OR r=6 OR r=7
OR r=8 OR r=12 OR r=13)
3012 IF r=2 AND NOT wake THEN  P
RINT '"The guard wakes up.": LET
 wake=1
3015 RETURN
3099 REM ** WAIT
3100 PRINT '"Time passes.": RETU
RN
3199 REM ** LIST
3200 LET print=0: IF b$<>"" THEN
  GO TO 3250
3205 PRINT '"You are carrying:"
3210 RESTORE 30: FOR y=1 TO 10:
READ o$: IF NOT o(y) THEN  PRINT
 "      a ";o$: LET print=1
3215 NEXT y
3220 IF NOT print THEN  PRINT '"
```

```
nothing"
3225 RETURN
3250 RESTORE 35: FOR x=1 TO 3: R
EAD p$: IF p(x)=r AND p$=b$ THEN
 GO TO 3260
3255 NEXT x: PRINT '"I can't tel
l you anything about"'"the ";b$;
" at present.": RETURN
3260 PRINT '"The ";b$;" is carry
ing:"
3265 RESTORE 30: FOR y=1 TO 10:
READ o$: IF o(y)=13+x THEN  PRIN
T "       a ";o$: LET print=1
3270 NEXT y
3275 IF NOT print THEN  PRINT '"
nothing"
3280 RETURN
3299 REM SCORE
3300 PRINT '"You have solved ";s
c;"% of this"'"adventure.": GO T
O 100
6019 REM ** LOCATION DESCRIPTION
6020 PRINT " You are ";"alone "
AND p(1)<>r AND p(2)<>r AND p(3)
<>r;"in a gloomy"'"dungeon whose
 walls are lined"'"with solid st
one slabs.";" They    look depre
ssingly impregnable." AND NOT r(
1,4);"       A passage leads
west." AND r(1,4);'" The floor i
s of firm sand." AND NOT r(1,6);
"There is a deep hole in the san
d" AND r(1,6)
6025 PRINT '" The only light in
this dismal"'"place comes throug
h a small"'"barred window set in
to an iron"'"door in the south w
all.";" There isan iron ring on
the floor" AND ring: RETURN
6040 PRINT '" You are in the gua
rdroom, which"'"is illuminated b
y the flickering"'"light from a
torch on the wall."'" A passage
leads off to the east"'" and a f
light of stone steps"'"leads upw
ards."
6045 IF wake=0 THEN  PRINT '" Th
e guard slumps at a table,"'"asl
eep."
6046 IF wake AND p(2)=2 THEN  PR
INT '"The guard is now awake."
6050 RETURN
6060 PRINT '"You are in the jail
er's store"'"room. There is litt
le here of"'"interest apart from
 a wooden"'"chest in one corner
of the room."'" A rough plank ha
s been fixed to"'"one wall to se
rve as a shelf."'" There is a t
rapdoor in the"'"middle of the f
loor.": RETURN
6160 PRINT '"You are in a confus
ing network"'"of underground pas
sages leading"'"in all direction
s."
6165 IF r=4 OR r=6 OR (r=7 AND h
ole) THEN  PRINT '"A dim light c
omes from above."
6170 RETURN
6180 PRINT '" You are in a small
, damp cell"'"which seems to hav
e been carved"'"out of the solid
 rock."'" In the west wall ther
e is a"'"wooden door. It is obvi
ously old"'"-but still a formida
ble obstacle" AND NOT r(9,4);"an
d it now sags open." AND r(9,4)
6185 IF p(3)=17 THEN  PRINT '" S
hackled by strong chains to"'"th
e wall is a dwarf-still alive"'"
but clearly feeling sorry for"'"
himself."
6190 RETURN
6200 PRINT '" You are in a dark
passage."
6205 IF r(r,2)=0 THEN  PRINT '"A
 large boulder blocks the"'"rout
e south."
6210 IF r(r,2) THEN  PRINT '" A
large boulder lies beside the"'"
entrance to a passage leading"'"
southwards."
6215 RETURN
6220 PRINT '"You are in a large
chamber at"'"the top of a flight
 of steps."'"In the south wall i
s an enormousstone door." AND NO
T r(11,2);"The stone door is ope
n." AND r(11,2)
6225 IF NOT r(10,2) THEN  PRINT
'" A passage leading north is"'"
blocked."
6230 IF r(10,2) THEN  PRINT '"A
passage leads north."
6235 RETURN
6240 PRINT '"You are outside the
 stone door"'"which is set into
a large, flat"'"rock face at the
 northern end"'"of a barren, win
dswept valley.": RETURN
6260 PRINT '"You stand in the fo
othills of"'"Grim Mountain. To t
he south a"'"path winds away tow
ards a small"'"town overlooked b
y a splendid"'"castle. Home is i
n sight!"'" You set off along t
```

```
he path, to"'"prepare your peopl
e for war..."
6261 LET sc=sc+1Ø
6262 IF p(3)=12 THEN  PAUSE 2ØØ:
 PRINT '"The dwarf says:"'"What
are the lunches like at"'"your p
lace....?"
6264 PRINT '"You have solved ";s
c;"% of this"'"adventure.": GO T
O 9998
9ØØØ RETURN
95ØØ CLS
95Ø5 PRINT " You are the king of
 a small"'"province in Middle Ea
rth."'" For some time your lands
 have"'"suffered raids from the
mountain"'"orcs, and these came
to a head"'"some weeks ago when
a massive"'"attack was launched.
"'" During this raid you were"'"
captured, and you are now held"'
"in the orc dungeon, deep in"'"t
he mountains."
951Ø PRINT '"Without you, your p
eople are"'"demoralised, and an
easy prey"'"to the orcs. It is t
herefore"'"vital that you escape
....."
9515 IF INKEY$="" THEN  GO TO 95
15
952Ø CLS
9525 PRINT "        INSTRUCTIONS"
953Ø PRINT "The following verbs
may be used"'"in two-word (verb-
noun) commands"'"GET,TAKE,EXAMIN
E,OPEN,PUSH,PULL,EAT,DRINK,DROP,
FIGHT..and others"'"To move, ent
er a single letter"'"(n,s,e,w,u,
d)"
9535 PRINT '" You may instruct o
ther"'"characters to do things"'
"(eg:TELL GUARD GET BOTTLE)"'"-t
hough they may not obey!"'" You
may give objects to other"'"char
acters (eg:GIVE BOTTLE TO"'"GUAR
D)"
954Ø PRINT '"LIST will tell you
what you are"'"carrying."'"LIST
GUARD will tell you what"'"the g
uard is carrying."'"HELP elicits
 a useful clue."'"WAIT allows ti
me to pass."
955Ø IF INKEY$="" THEN  GO TO 95
5Ø
9555 CLS
956Ø PRINT "You should know that
 you are in"'"a very weakened st
ate after"'"spending some weeks
in the"'"dungeon. You will need
to build"'"up your strength befo
re tackling"'"anything at all st
renuous."'"Furthermore, others w
ill do what"'"you ask only if th
ey like you."'" At the start of
 this adventure"'"you are very u
npopular!"
9562 PRINT '"And if all else fai
ls, QUIT "'"will restart the gam
e...."
9563 PRINT '"For a fresh look at
 your"'"surroundings, type ""l""
"
9564 PRINT '"SCORE will tell you
 how well you"'"are doing..."
9565 IF INKEY$="" THEN  GO TO 95
65
957Ø CLS : GO TO 78
995Ø RESTORE 998Ø: FOR i=1 TO 12
: FOR j=1 TO 6: READ a: LET r(i,
j)=a: NEXT j: NEXT i
9955 FOR i=1 TO 1Ø: READ a: LET
o(i)=a: NEXT i
996Ø FOR i=1 TO 3: READ a,b: LET
 t(i)=a: LET p(i)=b: NEXT i
997Ø RETURN
998Ø DATA Ø,Ø,Ø,Ø,Ø,Ø
9981 DATA 1,Ø,3,Ø,11,Ø
9982 DATA Ø,Ø,Ø,2,Ø,Ø
9983 DATA 4,4,8,4,6,5
9984 DATA 5,8,8,6,7,4
9985 DATA 6,7,5,7,9,8
9986 DATA 6,1,8,6,3,5
9987 DATA 5,4,5,7,6,7
9988 DATA Ø,Ø,Ø,Ø,Ø,6
9989 DATA 9,Ø,Ø,Ø,Ø,Ø
999Ø DATA Ø,Ø,Ø,Ø,Ø,2
9991 DATA 11,13,Ø,Ø,Ø,Ø
9992 DATA 1,14,1,17,8,17,17,14,1
4,17
9993 DATA 1Ø,2,1Ø,2,Ø,17
9998 IF INKEY$="" THEN  GO TO 99
98
9999 RUN
```



Adventure Software Checklist

We have compiled as comprehensive a checklist of adventure programs as we could. When we have reviewed or had a chance to look at a program we have followed it with a code which is made up of letters which represent the following details.

- T Text
- G Graphics are used
- A Animation is used
- C Independent character action is featured
- F Fantasy of the swords and sorcery type
- H Historical scenario
- S Science fiction plot
- M Modern (or near) Day setting
- X ZX81 program
- Y Spectrum program
- — Nothing known
- * Recommended by the ZX Computing team.

So if we look at Ship of Doom, Artic, TSXY * then we can see it as a text adventure, Science fiction storyline, for both the ZX81 and the Spectrum and someone in our office (me in this case) liked it.

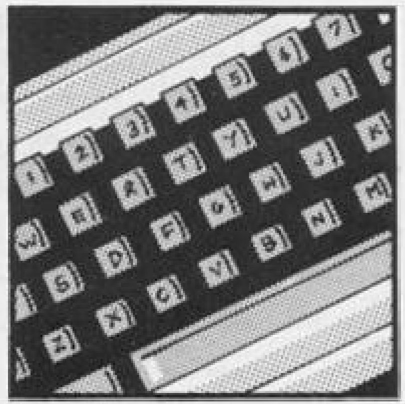
Apologise to anyone who has been overlooked and, before you all start writing in and complaining that we haven't starred your favourite adventure, the absence of a star does not necessarily mean we disliked that program, just that we may not have actually been sent that one for review, so we have no idea what it's like.



NAME	COMPANY	CODE
----	-------	----
1942 Mission	CCS	TMY
Abyss	CCS	-Y
Ace in the Hole	Add-on	-Y
Adventure	Bug-Byte	-X
Adventure 1	Abersoft	-X
Adventure Island	Contrast	-Y
Adventure Quest	Level 9	-Y
Alien	APS	TSY*
Arcane Quest	Add-on	-Y
Atlas Assignment	Virgin	TGAMY
Aztec	Hill MacGibbon	TGHY*
Barrowquest	CCS	TFY
Black Crystal	Mastervision	-XY
Black Dwarf's Lair	New Soft	-Y
Black Planet	Phipps	-Y
Buffer Adventure	Buffer Micro	TMY*
Byte	CCS	-Y
Castle	Bug-Byte	-Y
Castle Blackstar	SCR	TFY*
Circus	Channel 8	-Y
City of Ehdollah	Goldstar	TFY*
Classic Adventure	Melbourne House	TFY*
Colditz	Phipps	-Y
Colossal Adventure	Level 9	-Y
Colossal Caves	CP Software	-Y
Crusoe	Automata	TGAHY*
Cry Wolf	Add-on	-Y
Cuddles	8th Day Software	TFY*
Demon Lord	MCE	-Y
Denis through the Drinking Glass	Application Software	TMY*
Detective	Arcade	-Y
Devils of the Deep	R. Sheperd	-Y
Diamond Quest	CCS	-Y
Diamond Trail	Gilsoft	-Y
Doomdark's Revenge	Beyond	TGFY*
Dragonsbane	Quicksilva	GAFY*
Dungeon Adventure	Level 9	-Y
Dungeon Master	Crystal Computing	-Y
Dungeons of Doom	Woolsoft	-X
Dungeons of Doom	Temptation	-Y
Eric the Viking	Mosaic	TGFY*
Espionage Island	Artic	TMXY*

Eureka '	Domark	TGAHY*
Eye of Bain	Artic	-Y
Faerie	8th Day Software	TFY*
Falls of Shalor	Emprise	TFY
Fantasia Diamond	Hewson	TGCFY*
Final Mission	Incentive	-Y
Flight from the Dark	Five Ways Software	TGFY
Four Minutes to Midnight	8th Day software	TMY*
Frog Face	Positive Image	-Y
Genesis II	Mikro-Gen	TSY
Golden Apple	Artic	-Y
Gorgon	Phipps	-Y
Great Western	New Soft	-X
Greedy Gulch	Phipps	-X
Hampstead	Melbourne House	TMY*
Here comes the Sun	Alligata	-Y
Hobbit	Melbourne House	TGCFY*
Hole	Add-on	-Y
Horror Atoll	Add-on	-Y
HULK	Adventure International	TGFY*
Ice Station Zero	8th Day Software	TMY*
Inca Curse	Artic	-XY
Inferno	R.Sheperd	TGCY
In Search of Angels	8th Day Software	TFY*
Invincible Island	R.Sheperd	TGFY
Island	Crystal	-Y
Island	Virgin	TGAFY
Islets of Langerhans	Amazing Games	TFY*
Jerico Road	Shards	-Y
Jokers Wild	Phoenix	-Y
Jungle Adventure	CCS	-Y
Kentilla	Micromega	TGFY*
Key to Time	Lumpsoft	TSY
King Arthur's Quest	Hill-Macgibbon	TGFY*
Knight's Quest	Phipps	-XY
Legend	Century Communications	TFY*
Leopard Lord	Add-on	-Y
Lords of Midnight	Beyond	TGCFY*
Lords of Time	Level 9	THY*
Lost Island	JRS	-X
Lost over Bermuda	Add-on	-Y
Magic Mountain	Phipps	-X
Merchant of Venus	Crystal	-X
Mountains of Ket	Incentive	TFY*
Mysterious Fairground	Buffer	TMY
Odyssey of Hope	Martech	TGFY
Oracle's Cave	Doric	TGAFY*
Orb	Computer Rentals	-Y
Orc Slayer	Gamma Software	-Y
Paradox	Runesoft	-Y
Perseus and Andromeda	Channel 8	-Y
Peter Pan	H & S	-Y
Pharoes Tomb	Phipps	-X
Pimania	Automata	TGAFXY*
Prince	CCS	TFY*
Quann Tulla	8th Day Software	TFY*
Quest	Hewson	-Y
Quest for Eternity	APS	TSY
Quest for the Holy Grail	Dream	-Y
Quest for the Holy Joystick		-Y
Quetzalcoatl	Virgin	TGHY
Return to Eden	Level 9	TGSY*
Roundsby Incident	Add-on	-Y
Runes of Zendos	Dorcas	TGAFY*
Sandman Cometh	Star Dreams	-Y
Secret Valley	New Soft	-X
Serpents Tomb	Vortex	-X
Sherlock	Melbourne House	TMY*
Ship of Doom	Artic	TSXY*
Snowball	Level 9	TSY*
Solaris	Softel	-Y
Spider-Man	Adventure International	TGFY*
Spoof	Runesoft	-Y
Staff of Zaranol	CCS	TFY
Superspy	R.Sheperd	-Y
System 15000	Craig Communications	-Y*
Temple of Vran	Incentive	TFY*
Terror from the Deep	Add-on	-Y
Time Bandits	New Soft	-X
Time Quest	Mikro-Gen	-Y
Tir Na Nog	Gargoyle	GAFY*
Titanic	R&R	-Y
Tower of Despair	Games Workshop	TFY
Twin Kingdom Valley	Bug-Byte	TGFY
Urban Upstart	R.Sheperd	-Y
Valhalla	Legend	TGAFY*
Valkyrie 17	Ram Jam Corp.	TMY*
Velnor's Lair	Quicksilva	-Y
Volcanic Dungeon	Mastervision	-XY
War of the Worlds	CRL	-Y
Waxworks	Digital Fantasia	-Y
Witches Cauldron	Mikro-Gen	TGFY*
Ziggarat of Dread	Add-on	-Y
Ziggurat	Software Super Savers	TGFY*

First steps in Machine Code



Part 3 — Using flags.

An introduction to Z80 Machine Code by David Nowotnik

One of the essential features of all computer programming languages is the ability to test a conditon, and take different courses of action according to the result of that test (IF . . . THEN . . . in BASIC). Machine code is no exception, and in this article I shall be examining how the Z80 processor makes decisions. There will also be a little on simple arithmetic, and one of the Z80's powerful load instructions, which enables large chunks of memory to be moved with a few bytes of code.

1. The flags

In part 1 of this series, I described how a register in the Z80 CPU, or a byte of memory, is made up. If you recall, there are eight bits within a register or byte, each bit has two states, 0 or 1. It is the combination of values of bits within a byte that makes up the value held by the register or byte.

The F register in the CPU is a special purpose register in which the individual bit values are far more important than the total byte value. 'F' stands for 'flag'; it is the bits of the F register which 'flag' messages to the processor, and to the machine code program. Following almost every single instruction carried out by the Z80 processor, the flag register is automatically modified according to the nature and result of the operation performed. In effect, the CPU tests the result of the operation, and the results of the test are recorded as yes/no answers (1 or 0) by certain bits (flags) within the F register. Not all the flags are of value to the machine code programmer; those that can be used are described below:

The Carry (C) Flag — This tests whether an addition or subtraction operation remainined within the limits of a byte value (0-255), or if carry or borrow occurred. Other applications will be demonstrated later in the series.

The Parity/Overflow (P/V) Flag — Tests the parity of the result of an operation. This involves counting the '1's in the bits which form the result byte. If the parity sum is odd, then the P/V flag is set to 0. The flag is also used to demonstrate a 'carry' in two's complement arithmetic (also dealt with later on).

The Zero (Z) Flag — Set to 1 if the result of an operation is zero, otherwise this flag is set to 0.

The Sign (S) Flag — This takes the valued of the highest bit (bit 7) of a register following an operation on that register. Don't worry if most of what I have described isn't too clear yet, it should become clear later on in the series.

A programmer can set (flag value = 1) or reset (flag value = 0) any of these flags (either directly, with a specific machine code instruction, or indirectly with a 'dummy' operation). More often, the programmer will want to test whether a flag has a value of 1 or 0, and respond accordingly. That response usually means moving (or not moving) to another part of the program. In BASIC, this could be GOTO, or GOSUB (or RETurn from subroutine) if the condition is, or is not, met. The same choices are available in machine code. These are shown in table 2.

There are two machine code instructions which are equivalent to BASIC's GOTO. These are JP and JR. JP stands for jump absolute, and JR for jump relative. JP instructions are usually three bytes long; the first is the opcode, the second and third contain the address in memory to which the program will jump. The address is calculated as the value in the second byte plus 256 times the value in the third byte. JR instructions are two bytes long; the first is the opcode, and the second is the distance (and direction) of the relative jump. The jump is calculated in exactly the same way as DJNZ, described last time. That is, the jump can be anywhere from −128 to +127 from the address of the opcode immediately following the JR instruction.

JR has the advantages that it uses two instead of three bytes, and the jump is independent of the position of the machine code in memory, so should be used in preference to JP. If the jump is greater than the limits set on JR, then JP is easier to use (it is not impossible to use JR for large jumps, but it could be tricky to program).

The equivalent of GOSUB in assembly language is CALL. It works in just the same way. The argument of CALL is an address in memory, so the instruction is three bytes long (the first for the opcode, the second and third the address in memory). Unfortunately, the Z80 processor does not allow relative CALLs. The subroutine is terminated with the RET instruction, which, like the RETurn command in BASIC, returns the operation of the program to the instruction immediately following the CALL instruction which initiated the subroutine.

JP, JR, CALL, and RET all have unconditional (i.e. not dependent on a test of any flag) as well as conditional options. Most of these are shown in Table 1.

2. Comparisons

A simple example of using flags is in conjunction with the assembly language instruction CP (compare). This allows the contents of the A register to be compared with the contents of any other register, or the contents of a byte in memory (indexed by HL). In effect, with CP, the CPU carries out a subtraction between the A register contents, and the register or byte with which it is being compared. The result is not stored anywhere, but the result effects the values of the flags. For example, here is a typical assembly language sequence involving CP:

```
CP E
JR NZ, next
```

Having compared the value in the A register with that in the E register, the CPU sets or resets the zero (Z) flag according to the result. If A = E, then the Z flag = 1, and if A does not equal E, then the flag is reset to 0. The instruction 'JR NZ, next' tests the value of the Z flag. If the flag is not zero (NZ), then a relative jump to the position in the program labelled 'next' will occur; if the flag is set, then the program continues with the instruction immediately following 'JR NZ, next'. Other flags are set or reset according to the relative values of the two registers being compared. It is possible to test whether one is greater or less than the other. Rather than tell you all of these, I have given you a program which will show the effect of certain comparisons. this is the first example given later on in the article. By setting different values in the registers, you should be able to determine for yourself the flag settings for 'less than' or 'greater than' using this program. Why not try it!

Addition and subtraction

Like it or not, computer programs almost invariably involve some arithmetic, and machine code is no exception. The facilities for arithmetic on the Z80 processor are quite simple; addition, subtraction, and instructions (which I'll cover in a later issue) to effectively multiply and divide by two. All other mathematical operations are made up from these basic opera-

tions. Last time, I described the simple cases of adding or subtracting one (INC and DEC) from a register, or register pair. There are a number of machine code instructions which allow more complex addition and subtraction. For these, the choice of register is more limited than with INC and DEC. A single register addition or subtraction must always involve the 'A' register. Addition takes the form of adding the contents of the A register to another register or byte in memory (addressed by the HL pair), or a number (operand) in the program, and placing the result in the A register. Similarly, subtraction involves taking the value of a register, memory byte, or operand from the value in 'A' and placing the result back in the A register.

Two byte arithmetic is more restricted. Addition involves taking the contents of the HL register pair, adding the contents of another register, and placing the result in HL. Subtraction involves subtracting a register pair value from the value in HL, and placing the result in HL. In single byte arithmetic, numbers are restricted to the range 0 to 255, whilst the range for two byte arithmetic is 0 to 65535.

A further complication is the carry flag. It is possible to add two numbers, then add the value of carry (0 or 1) to the result just before storing the final value. And it is possible to subtract the complement (1 minus the value) of the carry flag from the result of subtracting two values, before storing the result. This gives two forms of add (ADD and ADC) and two forms of subtract (SUB and SBC); without and with the carry flag. Confused? I'll try and explain.

For simple arithmetic, it's easier to use the forms of add or subtract which do not use the carry flag value (ADD and SUB). So, if you are adding two registers or two register pairs, or subtracting two registers, use ADD or SUB. That way there is little chance of a mistake being made by an incorrect setting of the carry flag. The carry flag will, of course, be set (or reset) by the result of the addition/subtraction. For more complicated arithmetic, involving numbers held in several bytes, you'll want to use ADC or SBC. The purpose of involving the carry flag is that you can register whether or not there has been an addition or subtraction which has resulted in a value greater or smaller than that allowed by the restrictions on the register size. In this way you can carry a value to the next addition/subtraction, as you would carry one into the 'tens' column, having added 6 and 5 in the 'units'. Before using ADC or SBC it is usual to reset (for ADC) or set (for SBC) the carry flag before carrying out the calculation. The assembly language instruction to set the carry flag is SCF. There is no direct instruction to reset the carry flag, but this can be carried out by first setting the carry flag with SCF followed by the instruction CCF (complement carry flag), which inverts the value of the carry flag (0 to 1, or 1 to 0). The two instructions are one byte each (opcodes are 37 (SCF) and 3F (CCF), hex). The carry flag can be reset in one byte; I'll show you how next time.

You'll see all the opcodes for the add and subtract in Table 2. Note that for two byte subtraction, only SBC is available, so be sure to set the carry flag when using it for simple arithmetic. Fig 2 in the examples section, later on, provides a BASIC program which should help to clarify any doubts about the different add and subtract instructions.

Block loading

The final piece of theory for this issue is the Z80's powerful block load instruction. It allows the values in a block of bytes (of any size) in memory to be moved to another location. It works like this:

The starting address of the source block is loaded into the HL register pair, the starting address of the destination block is moved into DE, and the number of bytes to be moved goes into BC. Then one instruction LDIR performs the move. LDIR stands for LoaD Increment Repeat. The value in BC acts as a counter. The value in the byte addressed by HL is transferred to the byte addressed by DE; HL and DE are incremented, while BC is decremented, then the instruction repeats itself automatically until BC gets down to zero. There is a non-repeat alternative, LDI, where the byte value transfer takes place, and registers HL and DE are incremented, BC decremented, but the instruction is not repeated automatically. Beginners to machine code would normally use LDIR, and this is shown in the examples.

The Z80 offers an almost identical instruction called LDDR. To use this, the END addresses of the source and destination blocks are loaded into HL and DE, respectively, while BC still holds the number of bytes to be transferred. Each cycle of the instruction involves transfer from (HL) to (DE), and all three register pairs decremented. LDD is the non-automatic repeat version of LDDR. It doesn't really matter whether you use LDIR or LDDR unless there is some overlap between the source and destination blocks of memory. Then, the choice is critical if bytes are not going to be corrupted. I'll leave you to sort out which should be used, depending on whether the overlap is at the beginning or end of the source block! The block move opcodes are shown in Table 2.

Examples

The first two examples given this time are written in such a way that they will work on both the ZX81 and Spectrum. Example 1 is the flag demonstration program, and all details appear in fig.1. Example 2 demonstrates add and subtract, and should help explain any questions you might have on all the arithmetic instructions mentioned earlier. Fig.2 contains the details of this.

The final example carries out similar block move operations on both ZX81 and Spectrum; copying the display file to a safe area of RAM, then returning it 'instantly'. Machine differences prevent the same code working on both machines, so ZX81 users should refer to fig.3, while Spectrum owners go to fig.4.

Next time we'll be looking at a stack which has little to do with chimneys, and some bit operations!

Spectrum users should type in the following listing as shown (Figure 1). A minor change should be made by ZX81 users.

Table 1 Testing Flags

a) Symbols and flag values

Flag	Flag = 1	Flag = 0
C	C (Carry)	NC (No carry)
Z	Z (Zero)	NZ (No zero
P/V	PO (parity odd)	PE (parity even)
S	P (positive)	M (negative)

b) Valid operations, and their opcodes

Unconditional Operation	Conditional Operations: Flag: C	P/V	Z	S
JP (C3)	JP C (DA) JP NC (D2)	JP PO (E2) JP PE (EA)	JP Z (CA) JP NZ (C2)	JP P (F2) JP M (FA)
JR (18)	JR C (38) JR NC (30)	— —	JR Z (28) HR N (20)	— —
CALL (CD)	CALL C (DC) CALL NC (D4)	CALL PO (E4) CALL PE (EC)	CALL Z (CC) CALL NZ (C4)	CALL P (F4) CALL M (FC)
RET (C9)	RET C (D8) RET NC (DO)	RET PO (EO) RET PE (E8)	RET Z (C8) RET NZ (CO)	RET P (FO) RET M (F8)

Table 2. Arithmetic and block move opcodes

1. Arithmetic

Instruction	A	B	C	D	E	H	L	(HL)	n
	Register (r)								
ADD A,r	87	80	81	82	83	84	85	86	C6
ADD A,r	8F	88	89	8A	8B	8C	8D	8E	CE
SUB A,r	97	90	91	92	93	94	95	96	D6
SBC A,r	9F	98	99	9A	9B	9C	9D	9E	DE

Instruction	Register pair (rr) HL	DE	BC
ADD HL,rr	29	19	09
ADC HL,rr	ED6A	ED5A	ED4A
SBC HL,rr	ED62	ED52	ED42

Block moves

Instruction	Opcode
LDI	EDAO
LDIR	EDBO
LDD	EDA8
LDDR	EDB8

Instead of line 60 type in the following two lines:

60 POKE 16388,47

70 POKE 16389,117

Once you have completed entry of the listing, goto the explanation at the end of the the listing.

Fig. 1. Demonstration of flags

```
10 REM FLAG DEMO
20 ZX COMPUTING, 1985
30 REM
40 REM INITIALISE
60 CLEAR 29999
100 DIM F$(8,3)
110 LET F$(1)=" S "
120 LET F$(2)=" Z "
130 LET F$(6)="P/V"
140 LET F$(8)=" C "
200 REM ENTER MACHINE CODE
210 LET X=30000
220 LET T=0
230 INPUT Y
240 IF Y=-1 THEN GOTO 300
250 POKE X,Y
260 LET X=X+1
270 LET T=T+Y
280 GOTO 230
300 IF T=2100 THEN GOTO 500
310 PRINT "CHECKSUM ERROR (";T;")"
320 STOP
500 CLS
510 PRINT AT 21,0;"ENTER 'A' REGISTER
    VALUE"
520 INPUT A
530 PRINT AT 21,0;"ENTER THE
    COMPARISON VALUE"
540 INPUT C
550 POKE 32500,A
560 POKE 32501,C
570 IF USR 30000 THEN
580 CLS
590 PRINT
600 PRINT "VALUE IN 'A'
      REGISTER IS ":A
610 PRINT
620 PRINT "COMPARISON VALUE = ";C
630 PRINT
640 PRINT "FLAGS ARE SET AS:"
650 LET X=32502
660 FOR I=1 TO 8
670 PRINT
680 IF I=3 OR I=4 OR I=5 OR I=7 THEN
    GOTO 700
690 PRINT F$(I);"     ";PEEK X
700 LET X=X+1
710 NEXT I
720 PRINT AT 20,2;"PRESS ANY KEY
    TO CONTINUE"
730 IF INKEY$="" THEN GOTO 730
740 GOTO 500
```

Once you have typed in the listing, SAVE the program, then RUN it. You'll get an INPUT request on the screen. This is the first part of the program, and you're expeced to enter the machine code routine as a series of decimal numbers. Refer to the assembly language listing, below, and enter the numbers on the left hand side, in the order shown. Once you have entered all 22 numbers, enter −1, which informs the program that you have come to the end. If you made a mistake on entry then a checksum should detect it, and stop the program going any further. Once you enter the main routine, on screen instructions and display should be clear enough to make further description unnecessary.

There are three new machine code commands in the routine outlined below. They'll be covered in the next two parts of this series.

```
33,244,126            LD HL,3250
126                   LD A,(HL)
35                    INC HL
190                   CP (HL)
245                   PUSH AF
209                   POP DE
6,8                   LD B,8
35              LOOP  INC HL
54,0                  LD (HL),0
203,19                RL E
48,2                  JR NC, NEX
54,1                  LD (HL),1
16,245          NEXT  DJNZ, LOOP
201                   RET
```

Fig. 2. Demonstration of Z80 Arithmetic Instructions

```
 10 REM MACHINE CODE ARITHMETIC
 20 REM ZX COMPUTING, 1985
 30 REM
 40 DIM A$(4,3)
 50 LET A$(1)="ADD"
 60 LET A$(2)="ADC"
 70 LET A$(3)="SUB"
 80 LET A$(4)="SBC"
 90 DIM N(2,2)
200 LET X=0
210 GOSUB 500
220 LET X=7
230 GOSUB 500
240 GOSUB 560
250 PRINT AT 21,0;"PLACE A VALUE
IN UPPER TWO BYTES"
260 INPUT U
270 LET S=U
280 LET P=2
290 GOSUB 1000
300 PRINT AT 21,0;"PLACE A VALUE
IN LOWER TWO BYTES"
310 INPUT L
320 LET S=L
330 LET P=9
340 GOSUB 1000
350 PRINT AT 21,0;"PLACE A VALUE
IN THE CARRY FLAG "
360 INPUT C
370 IF C=1 OR C=0 THEN GOTO 5000
380 GOTO 360
500 PRINT AT X,5;"**************
********"
510 FOR I=1 TO 4
520 PRINT "    *          *
    *"
530 NEXT I
540 PRINT "     ***************
******"
550 RETURN
560 PRINT AT 14,10;"*****    *
****"
570 FOR I=15 TO 17
580 PRINT AT I,10;"*    *    *
 *"
590 NEXT I
600 PRINT AT 18,10;"*****    *
****"
610 PRINT AT 19,12;"A          CAR
RY"
620 PRINT AT 6,10;"LO          HI
"
630 PRINT AT 4,0;"(HL)"; AT 9,0;
"(DE)"
640 RETURN
680 PRINT AT 21,0;"
                    "
690 RETURN
750 FOR Q=1 TO 20
760 GOSUB 800
770 NEXT Q
780 RETURN
800 FOR L=1 TO 2
810 NEXT L
820 RETURN
900 FOR T=1 TO 10
910 PRINT AT -5+R*7,X*10-1;"
"
920 GOSUB 800
930 PRINT AT -5+R*7,X*10-1;N(R,
X)
940 GOSUB 800
950 NEXT T
960 RETURN
1000 LET SS=INT (S/256)
1010 LET ST=S-SS*256
1020 PRINT AT P,9;ST; AT P,19;SS
1030 LET P= INT (P/9)+1
1040 LET N(P,1)=ST
1050 LET N(P,2)=SS
1060 RETURN
2000 PRINT AT 21,0;"LD (DE),A"
2010 GOSUB 750
2020 LET R=2
2030 GOSUB 900
2040 PRINT AT 16,11;"    ";AT 16,
11;N(2,X)
2050 RETURN
2100 IF W>255 THEN GOTO 2150
2110 LET C=0
2120 LET N(2,X)=W
2130 GOTO 2170
2150 LET C=1
```

```
,325    Start of data store
(HL)    Load 'A' register
L       Move to next byte
L)      compare its value to 'A'
AF      copy the F register
E       into the E register
B       Load loop counter
L       Move to next byte
L),0    place 0 into it
        Move 1 bit of E into carry
, NE    jump to NEXT if bit is 0
L),1    place 1 into byte
LOO     Loop back to LOOP, unless
        all 8 done, then return.
```

```
2160 LET N(2,X)=W-256
2170 FOR T=1 TO 10
2180 PRINT AT 16,11;"   ";AT 16,2
2;"  "
2190 GOSUB 800
2200 PRINT AT 16,11;N(2,X);AT 16,
22;C
2210 GOSUB 800
2220 NEXT T
2230 RETURN
2300 PRINT AT 21,0;"LD (DE),A"
2310 LET R=2
2320 GOSUB 900
2330 RETURN
2400 IF W<0 THEN GOTO 2450
2410 LET C=1
2420 LET N(2,X)=W
2430 GOTO 2470
2450 LET C=0
2460 LET N(2,X)=256+W
2470 GOTO 2170
3000 PRINT AT 21,0;"INC HL      INC
DE"
3010 GOSUB 750
3020 GOSUB 680
3030 RETURN
5000 PRINT AT 16,22;C
5010 PRINT AT 21,0;" 1=ADD, 2=ADC
, 3=SUB, 4=SBC"
5020 INPUT M
5030 IF M<> INT M THEN GOTO 5020
5040 IF M<1 OR M>4 THEN GOTO 5020
5050 GOSUB 680
5060 PRINT AT 4,28;A$(M)
5070 GOSUB 5000+M*1000
5080 PRINT AT 21,0;"PRESS ANY KEY
TO CONTINUE"
5090 IF INKEY$="" THEN GOTO 5090
5100 RUN
6000 FOR X=1 TO 2
6010 GOSUB 2000
6020 PRINT AT 21,0;"ADD A,(HL)"
6030 GOSUB 750
6040 LET W=N(1,X)+N(2,X)
6050 LET R=1
6060 GOSUB 900
6070 GOSUB 2100
6080 GOSUB 750
6090 GOSUB 2300
6100 GOSUB 750
6110 IF X=2 THEN GOTO 6150
6120 GOSUB 3000
6150 NEXT X
6160 RETURN
7000 FOR X=1 TO 2
7010 GOSUB 2000
7020 PRINT AT 21,0;"ADC A,(HL)"
7030 GOSUB 750
7040 LET W=N(1,X)+N(2,X)+C
7050 LET R=1
7060 GOSUB 900
7070 GOSUB 2100
7080 GOSUB 750
7090 GOSUB 2300
7100 GOSUB 750
7110 IF X=2 THEN GOTO 7150
7120 GOSUB 3000
7150 NEXT X
7160 RETURN
8000 FOR X=1 TO 2
8010 GOSUB 2000
8020 PRINT AT 21,0;"SUB A,(HL)
8030 GOSUB 750
8040 LET W=N(2,X)-N(1,X)
8050 LET R=1
8060 GOSUB 900
8070 GOSUB 2400
8080 GOSUB 750
8090 GOSUB 2300
8100 GOSUB 750
8110 IF X=2 THEN GOTO 8150
8120 GOSUB 3000
8150 NEXT X
8160 RETURN
9000 FOR X=1 TO 2
9010 GOSUB 2000
9020 PRINT AT 21,0;"SBC A,(HL)"
9030 GOSUB 750
9040 LET W=N(2,X)-(N(1,X)+(1-C))
9050 LET R=1
9060 GOSUB 900
9070 GOSUB 2400
9080 GOSUB 750
9090 GOSUB 2300
9100 GOSUB 750
9110 IF X=2 THEN GOTO 9150
9120 GOSUB 3000
9150 NEXT X
9160 RETURN
```

When this program is RUN, there is on the screen a diagrammatic representation of two pairs of bytes in memory (addressed by HL and DE), the 'A' register and the Carry flag. The program asks you to insert two values (0-65535) into the pairs of bytes. The value is automatically split into low and high byte values, and placed in the appropriate box. You then select 1 or 0 for the carry flag, and the arithmetic operation (ADD, ADC, SUB, or SBC). A slow motion display then shows you what happens when you conduct two byte arithmetic using one byte instructions. The assembly language instruction appropriate to the operation being carried out will be shown at the bottom left of the screen. You should be able to see the effect on the carry flag and result of using the four different operations.

Fig. 3. ZX81 Block move demonstration

Type in the following listing, SAVE it. Before RUNning the program, Lower RAMTOP with two direct commands:

```
POKE 16388,231
POKE 16389,124
```

The hexloader places the machine code (shown below) into RAM. A screen message is then generated, and saved (line 140) to a safe section of RAM. The screen is cleared, and the display restored instantly by another machine code block load routine (line 180).

```
10 REM.................................
20 LET X=16514
30 LET A$="2A0C4011E77C011903EDB0C921E77C
ED5B0C40011903EDB0C9"
40 FOR I=1 TO LEN A$/2
50 LET J=16*( CODE A$-28)+ CODE A$(2)-28
60 IF PEEK X=27 THEN POKE X,J
70 LET X=X+1
80 LET A$=A$(3 TO )
90 NEXT I
100 CLS
110 FOR I=1 TO 20
120 PRINT "1234567890ABCDEFGHI"
130 NEXT I
140 RAND USR 16514
150 CLS
160 PRINT AT 20,0;"PRESS A KEY TO RESTORE DISPLAY"
170 IF INKEY$="" THEN GOTO 170
180 RAND USR 16526
```

```
Assembly language listing:

SAVE       LD HL,(16396)    2A0C40      Load D-FILE into HL
           LD DE, 31975     11E77C      Load RAMTOP into DE
           LD BC, 793       011903      Length of display file
           LDIR             EDB0        Block load
           RET              C9          Return to BASIC
RESTORE    LD HL, 31975     21E77C      Load RAMTOP into HL
           LD DE,(16396)    ED5B0C40    Load D-FILE into DE
           LD BC, 793       011903      Length of display file
           LDIR             EDB0        Block load
           RET              C9          Return to BASIC
```

Fig. 4. Spectrum Block Move Example Type in the following listing, SAVE it, then RUN it. After the machine code has been placed in position above RAMTOP (lines 10 to 80), a screen display is generated, and saved, then the screen cleared, and the display restored by another machine code block move.

```
10 CLEAR 24999
20 FOR i=25000 TO 25023
30 READ x: POKE i,x
40 NEXT i
50 DATA 33,0,64,17,112,98
60 DATA 1,0,27,237,176,201
70 DATA 33,112,98,17,0,64
80 DATA 1,0,27,237,176,201
90 CLS
100 FOR i=1 TO 20
110 PRINT INK i/3; PAPER 8-i/3;"
11112222333344445555666677778 8"
120 NEXT i
130 RANDOMIZE USR 25000
140 CLS
150 PRINT AT 12,0;"Press any key "
160 IF INKEY$="" THEN GO TO 160
170 RANDOMIZE USR 25012
```

Assembly language listing

```
25000   LD HL,16384   210040   Start of display file
        LD DE,25200   117062   Start of storage area
        LD BC,6912    01001B   No. of bytes moved
        LDIR          EDB0     Move them
        RET           C9       and return to BASIC.
25012   LD HL,25200   217062   Start of storage area
        LD DE,16384   110040   Start of display file
        LD BC,6912    01001B   No. of bytes moved
        LDIR          EDB0     Move them
        RET           C9       and return to BASIC.
```



The Collins Collection

Collins have started to produce under their own name, the books which were previously published under the Granada banner, and added to these are some interesting new publications.

SPECTRUM GAMESMASTER written by M. James, S. M. Gee and K. Ewbank is essentially the same as QL GAMEMASTER by the same authors, and proves that writing, like programming, is easier if you approach it in a structured manner. It is simple to convert to other machines! Nevertheless, the approach is good and a beginner (and probably those with some experience) will benefit from these books.

Interestingly, although essentially the same book with machine specific details altered, the QL version costs £7.95 and the Spectrum one £6.95. Oh well, I suppose if you can afford a QL you can afford the extra pound.

PROFESSIONAL AND BUSINESS USES OF THE QL by Colin Lewis also costs £7.95 and seems to be aimed at the business buyer who decides to purchase a computer to solve his business problems and then realises that they've only just started! A clearly written introduction to using the QL's packages in a practical way.

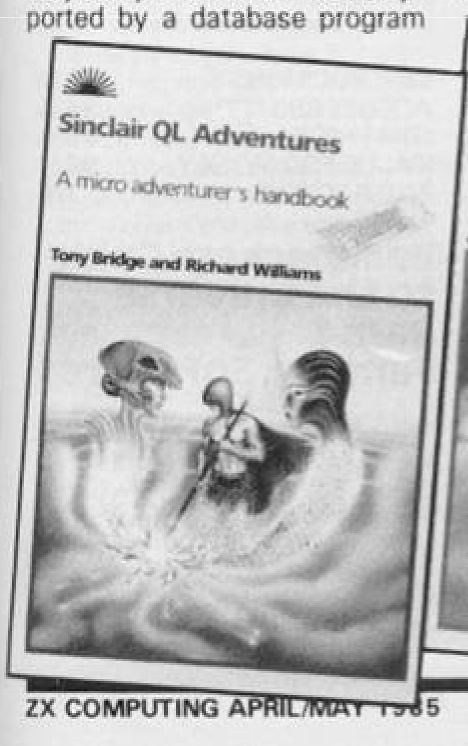
DATA LOG is superb! It is a book which is a programming course set out in a series of worksheets. A teacher I know was ecstatic over it and quite upset that his budget wouldn't allow him to buy the fifty he needed for his classes (he asked me to ask if there was any chance of an education discount). Priced at £2.95 it is a great way to introduce ANYONE, not only children, to computing.

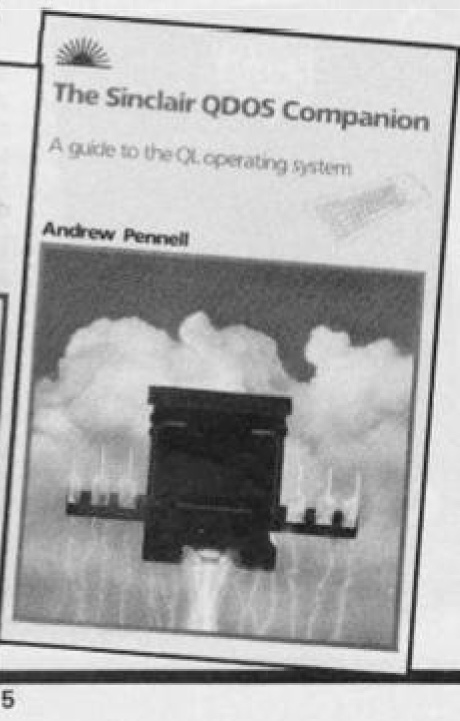
Sunshine on the QL

Two books from Sunshine, a very experienced company, and on two totally different topics.

SINCLAIR QL ADVENTURES by Tony Bridge and Richard Williams is an adventure writer's guide to writing adventure programs. It features an adventure generator program which seems very comprehensive. This is supported by a database program which holds the details of each particular adventure. £5.95.

THE SINCLAIR QDOS COMPANION by Andrew Pennell is an invaluable aid to any programmer who is working in machine code on the QL. All the system calls are covered as are all the special features such as multi-tasking. The cost is £6.95.





In .... Brief

• An unusual book from Addison Wesley is THE SECRET OF ARENDARVON CASTLE which provides a "novel" way of presenting an adventure game. Two thirds of the book are text, pictures, clues and scene setting, and the final third is a program for the game, a mighty machine code listing which they advise is entered in sections, appropriately labelled Monday, Tuesday etc. Available at £5.95

• Tim Hartnell, prolific as ever, has produced EXPLORING ARTIFICIAL INTELLIGENCE ON YOUR SPECTRUM+, AND SPECTRUM, the somewhat less verbose TIM HARTNELL'S QL HANDBOOK, and the GIANT BOOK OF SPECTRUM ARCADE GAMES.

The AI Spectrum book I found fascinating and five demo programs are provided to show some of the variuous aspects of this topic. The QL handbook is a collection of information and programs of a general nature and is useful for anyone who wants to use his QL in a non-business manner. The third one speaks for itself!

• Ian Stewart is the author of Shiva's latest book, GATEWAY TO COMPUTING WITH THE ZX SPECTRUM 2, on sale at £4.95. Big, bright and written in easy to understand text, presumably for children.

• ZX SPECTRUM GAME MASTER by P K McBride and INTRODUCING YOUR ZX SPECTRUM are two from Longman Software and both cost £3.95. The former is a collection of routines, programs, hints and ideas for the would-be programmer writing in BASIC. Some very useful material here.

• Another book for the absolute QL beginner is Quantam Theory by J. San, F. Katan, and S. Rockman, published by Century Communications at £5.95.

MATHS TUTOR FOR THE SPECTRUM by R. Carter is also published by this company at £7.95 and deals comprehensively with this specialised area. Essential for teachers of O or A level exams.

• Having problems with your Currah Microspeech unit insisting on sounding like a demented dalek with laryngitis? Well, Currah have produced a book of some 2980 words "as she is spoke" called the ALLOPHONE DICTIONARY. A time saving idea and worth the £3.50 if you frequently use your unit in your own programs.

• Melbourne House have produced an excellent book if you want to learn or improve your structured programming technique. The approach is to pose problems, discuss ways and means of solving them and let the reader get on and produce his/her own code. Hints and help are given if you get stuck. SPECTRUM SOFTWARE PROJECTS, a great book at £6.95.

• And now, the cassette of the book!

The programs in the J. Wiley & Sons Ltd book WINNING GAMES ON THE ZX SPECTRUM by Matthews are now available on tape for £9.94.

• STEP BY STEP KEYBOARDING ON THE PERSONAL COMPUTER is published by Barrons and written by S. Radlauer. It is aimed at increasing your computer and word processing output and costs £5.95 — sounds like something I should invest in!

• Two more in the Newnes series of beginner's guides have been produced, GUIDE TO MICROCOMPUTER LANGUAGES and GUIDE TO MICROCOMPUTING both cost £4.95.

• PROGRAMMING ARCADE GAMES FOR YOUR SPECTRUM by Adrian Jones is published by PAN. A useful introductory, or extra tips for those with some experience, type of book. But the addendum of the flash "for fun and profit" makes me feel that some appeal to the baser instincts of people may be exploited.

Let's keep computing fun, and, if the desire and ability is there then the rewards will follow. Meanwhile debit your balance sheet by £4.95 for this book.

• Another book for those fascinated by maths on the computer, aptly titled MICRO MATHS by K. Devlin and published by Macmillan. First add your pennies until the total is £5.95 then go and buy it. ■

Spectrum Arcade

David Harwood continues his battle against homicidal intruders and inferior software.

Packed into a small room with my trusty Sinclair Spectrum and the occasional cup of tea, I started to wade my way through the latest bunch of software. Below is the result of my hard work.

Travel with Trashman New Generation

This is the sequel to the original "TRASHMAN" game and by and large is just as good. The mission is to go forth into the world and throw away all the trash.

At the start of the game, you are shown a world map and all the countries that can be visited. this obviously takes money (everything seems to these days), and where you can go depends on the amount of money that you have got. Quite a few places of interest can be visited, Spain, America, Hong Kong, France, Germany, Samoa and Israel.

Paris is the cheapest place to start, and whilst there the job offered is to collect all the frogs that the chef has accidently let loose in the café, whilst avoiding bumping into the French waitresses (I know what I would rather do!). The café was generally well depicted with tables, umbrellas etc. but the leaping reptiles appeared as white dots bouncing around the screen, even the delicacy of its legs was not apparent.

In Germany, you're at the famous Festival with the mammoth task of clearing away all the empties, whilst trying to forget about your love for the drink as well. This screen was slightly easier to play and the only real difficulty was to catch sight of an empty glass.

After these two locations, you can go on to Spain, where you have to pick up roses in a bull ring. Sounds easy? The bull is still moving about the ring and still fancies a game or two. In New Orleans, you are employed to pick up the money that the crowd are throwing at the band, but some members of the band are mean and greedy, so you have to watch out for them. If you manage to get enough money, then you can be on your way to Jerusalem, where worshippers' tissues have to be tidied up around the Wailing Wall.

The only problem with this game was the fact that the visit to each country lasted far too long and as the money decreased with your inefficiency, it was quite difficult not to find yourself stranded, penniless, and with no means of getting home.

There is quite a lot of action in this game, and although occasionally the graphics were poor, this is a challenging game and should keep you amused for some time.

INSTRUCTIONS	80%
ADDICTABILITY	80%
GRAPHICS	80%
VALUE FOR MONEY	85%
ZXC FACTOR	7

Underwurlde Ultimate

Yes, yet another excellent game from Ultimate Play The Game. It is hard to imagine what will come next. Can they really beat the quality of this new genre of game?

This is what one would call an arcade adventure game, the only let-down being the key assignment. Q and W are used for left and right, R and E up and down, T for fire, any key on the first half of the bottom row to drop from the rope and any key on the second half of the bottom row to pick up or drop weapons. A fair improvement would have been to define your own keys as us arcadists do get accustomed to using certain keys. The usual joystick option applies, so if you have got one — USE IT.

You are unfortunate enough to be living in a house that has been built over the labyrinth of Hell. In this labyrinth, the task is to find the devil in his lair (the long dark palace) and then you will be beamed up to safety. An easy task? Not at all, as your travels are hindered by the devil's aides, fireballs, eagles, and gremlins to mention but a few. You can use various weapons, from a catapult to daggers, in the quest for your freedom.

If you happen to slip, then you see yourself fall down many levels to the bottom of the Underwulde and, unless you manage to land on one of the rising volcanic bubbles, a life is lost. When at the bottom, the only way to escape is to jump onto these bubbles, but there are many creatures who try to stop you gaining your freedom.

This is an excellent game, with some of the best animation that I have seen on the Spectrum with the guaranteed ULTIMATE quality.

INSTRUCTIONS	80%
ADDICTABILITY	45%
GRAPHICS	100%
VALUE FOR MONEY	95%
ZXC FACTOR	9

Cyclone Vortex software

We had Combat Lynx, then there was River Raid and now there is **CYCLONE** by Vortex Software.

An advancing Cyclone is proving dangerous to a number of islands and the whole area is being evacuated. Your mission is to fly your helicopter into the danger zone and recover the vital medical supplies.

There are five crates to collect in all, with the Cyclone and low-flying aircraft proving to be a great hindrance. Once a Cyclone is upon you, the helicopter does not seem to respond at all to the controls, so you have to hope that control is regained soon. Extra points can be gained by saving the inhabitants that are stranded on the islands, but I could not find a way to get them on board. So, I decided that it was more important to recover the supplies than wait around for people who couldn't be bothered to hoist themselves into my helicopter.

All the instruments are present on the right hand side of the screen and in order to help you with finding the crates, North and South views of the action. This adventure has excellent three dimensional graphics with a feel of reality, and in my mind is an ace above the others.

INSTRUCTIONS	90%
ADDICTABILITY	90%
GRAPHICS	95%
VALUE FOR MONEY	90%
ZXC FACTOR	8

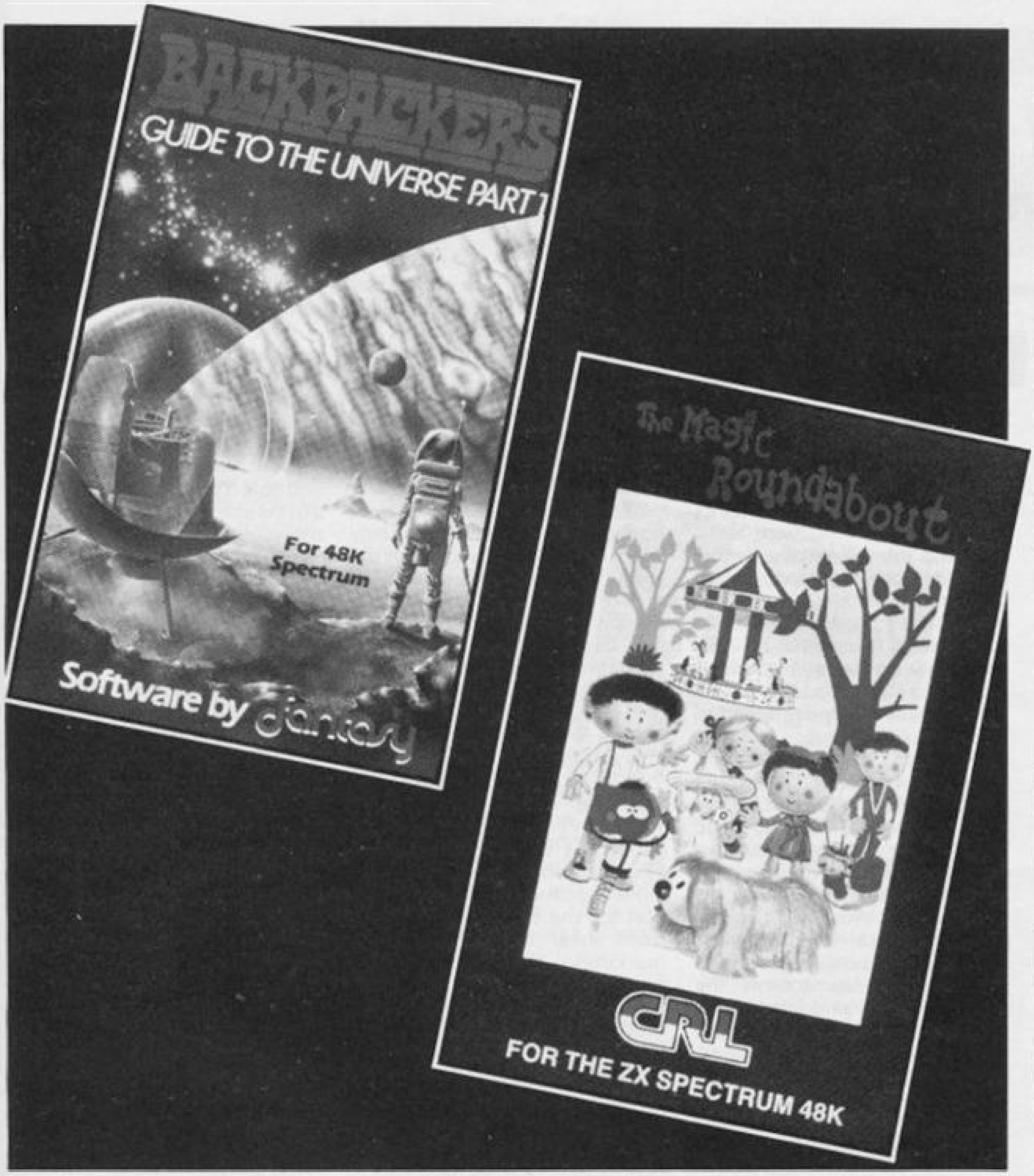
Backpackers Guide to the Universe Part 1 Fantasy Software

This game bears no relation whatsoever to The Hitchhiker's Guide To The Galaxy, which I am sure is where Fantasy Software pinched this title from.

Side one of the tape is the GUIDE, which takes you pleasantly through your mission







of saving the creatures on this planet, where the evil Scarthax threatens to pull the plug out in 24 hours time, and a magnified picture of each creature is given, along with a description.

Side two of the tape is the actual game, and you start off by selecting either the keyboard or joystick option and then fire away. You are equipped with one of the most advanced creations of our time, the backpack, which takes you around the planet, provides storage for the creatures and a flame thrower, which is your only weapon in your plight.

Damage to the backpack will not only take you back to the ship for repair, but also if too much activity occurs while fighting the fireball enemy, the creatures that you have saved will perish, and you will have to start afresh. You can also choose to go back to the capsule for repair, but as there is a time limit of 12 hours per game and repair always costs time, it is advisable to do this only when absolutely necessary.

As you travel along the passages of the planet, various objects can be picked up for later use, keys, indicator discs, which will help you find the location of the exit key, transporter crystals and dynamite. All these will help you travel across the planet and rescue as many creatures as possible.

At the end of the adventure, when you go back to the capsule for backpack repair, a score is given and also the option to save the state of the game so far.

This game is truly another arcade adventure and although the graphics are not up to the standard of Ultimate, they are still superb. The security coding at the beginning of the game is a very good idea, where you have to enter a code from a special grid, but I did find it a trifle confusing.

INSTRUCTIONS	90%
ADDICTABILITY	90%
GRAPHICS	90%
VALUE FOR MONEY	85%
ZXC FACTOR	8

Fahrenheit 3000
Softstone

Now we come onto a game of bad taste. A nuclear reactor is about to meltdown and it is up to you to go through the works and operate all the pressure valves in order to release the excess pressure and flood the core, which will hopefully shut down the reactor. Having done all this, if you solve the puzzle presented to you, there is the chance of winning a Mystery Prize.

With the jesting in the instructions, "Luckily, the worst that can happen is an enormous radiation leakage that could wipe out half of the South Coast" and "Shutdown the reactor before it shuts you down", I was put off immediately. This sort of idea, much the same as war inducing games, is unnecessary and far better games can be produced without this overhanging threat.

To add to this, the game is not very good. The graphics are inferior to even the Manic Miner type and I could not get further than the first screen even after about 2 hours of painful trying.

INSTRUCTIONS	80%
ADDICTABILITY	20%
GRAPHICS	50%
VALUE FOR MONEY	30%
ZXC FACTOR	3

And finally . . .

Magic Roundabout
CRL

Remember that t.v. programme just before the 5.40 news that everyone had to watch? This game is based on the series that was loved by millions.

The atmosphere is recreated in the enchanted garden as Dougal (the dog) is busily trying to build a home before it is time for bed. You, as Dougal, go around the garden collecting lumps of sugar to construct a house at the magic toadstool.

Dougal has the option to either push the lumps to the toadstool or eat them, as these lumps provide the energy. If his energy becomes low, then Dougal will fall asleep.

But the adventure does not stop there. You *will* also encounter all the other characters that captured the hearts of millions. Brian, Mr. McHenry, Basil, Florence, Zebedee, Ermintrude, Dylan, Mr. Rusty and the revolving Magic Roundabout. If Dougal touches any of these characters then a life will be lost, but they will all move away, apart from the Magic Roundabout, if Dougal barks at them. Zebedee has the annoying habit of appearing at random intervals causing a life to be lost.

Although the graphics are not too clear, with much character bleeding when overlapping occurs, the fantasy and theme music overcome this grumble quite easily. A must for all Magic Roundabout lovers.

INSTRUCTIONS	90%
ADDICTABILITY	85%
GRAPHICS	80%
VALUE FOR MONEY	90%
ZXC FACTOR	7

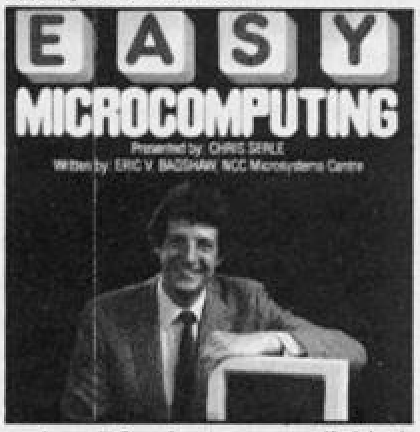
Shoptalk Shoptalk

Odds and ends, letters, and company info

Video computing

The pleasant and smiling face of Chris Serle catches the eye on the cover of this Video cassette and almost guarantees further investigation by the casual browser.

This is a painless introduction to the world of computers, hard though it is for us old hands to believe that there are still people who have never seen or used one. In fact, most of the population are not computerate. So, if you have bought this issue to try and initiate yourself into the mysteries of the machine, or, if you are a teacher looking for a way to introduce the subject to a class, then read on.



In a 78 minute tape, divided into four broad sections, Chris takes you gently and carefully into the world of the computer. This is not a programming course as is the other video on computing marketed by Master Class, but a comprehensive introduction to the whole subject. The four sections give a clear indication of the range and approach to the subject.

1. THE BASICS is NOT the programming language of the same name, but a section which covers the essential bits and pieces, hardware, an outline of how it operates, and some of the jargon that has become a part of computer life.

2. WHY COMPUTERISE? discusses the need for a computer in your life, and to help you decide if you really want one. Mostly for businessmen this bit, as every home computer owner knows why he wants one doesn't he/she?

3. HOW TO SELECT presumes you have decided that you really must get a computer and goes on to look at the different computers available for different applications, including home, desk top and multi-user. Software is also discussed.

4. SPECIFIC APPLICATIONS considers software for the range of different jobs you may wish to use the computer for. Games, Wordprocessing, Graphics, Modelling, Accounts etc.

I liked the essentially factual approach which didn't try to prove that the computer was the solution to your, and the rest of the worlds, problems. In fact very early on he says, "A new phrase has been added to our language: Computer Aided Bankruptcy".

Fresh off the press (or rather, Video recorder) is CTV's latest production, SELECTING BUSINESS SOFTWARE THE EASY WAY. More specialised than Easy Microcomputing but again featuring Chris Searle.

Using simple, non-specialised terminology and operating in conjunction with the book of the same name, the programme gives a course for the businessman who is considering investing in computerisation.

A letter from DK'Tronics programmer Don Priestly ("Minder" game)

Dear Sirs,

I've been writing computer games for the last three to four years and it's been an interesting and totally absorbing exercise to be an involved witness to the growing pains of this adolescent industry.

The computer owner in the 'good old days', back in the mists of time two years ago, used to buy practically everything the software houses could churn out. Imagine that! To do that now they'd need a state subsidy and a fifty hour day just to glance at the range on offer. In spite of an industry in the so-called doldrums a seemingly endless succession of titles shower like meteoroids onto the distributors, retailers and customers who are understandably becoming more confused and fed up. A result of this has been an incentive by some software houses to do whatever they can to ensure that their own particular products get more than a passing glance, hence the link-up with familiar titles.

They are after the guy who is hooked on, or at least fairly habitual listener or viewer of the link-up material. He is also, of course, the proud owner of a Mark VI Spectadore. Browsing one day in his local computer software emporium his roving glance is stopped by the familiar title perhaps accompanied by a picture of some very familiar characters.

'Oh, it's 'The Z-Team. My favourite' or 'Oh The Z-Team. You can't make a computer game out of that. Can you?' There is a chance of a sale here, either because of their admiration for the original material or from sheer curiosity. From a marketing point of view, it seems like a dream come true. Tut Tut, I'm being cynical; an attitude not altogether unjustified, but I do believe that although such link-ups are mainly for marketing purposes, a great majority of software houses, to protect their reputation and future, will try to deliver the goods. The short history of link-ups is that of reasonable success but with at least one spectacular failure.

The software house, with the necessary agreements, delves into a veritable cornucopia of material successfully pushed out by the media and picks out something suitable for conversion. Meanwhile, back at the fort, some poor code junky, who may be bubbling over with brilliant but completely unsaleable ideas, has dropped on him, from a great height, the task of distilling, editing, condensing and forcing the material available into the mean and claustrophobic confines of the average micro. The tables are turned. No longer can he dream up some technical or visual wizadry to perform on his Mark VI and then wrap a game around it, but has to perform a task which is, I would think, pretty novel for a majority of software writers.

The trouble with a vast proportion of potential link-ups is the very nature of the material itself. At some future date when the technology has given the programmer the freedom he craves, maybe the TV producers will beat a path to the door of the software company for his material. We can but dream!

The core of the problem is that TV, radio, records, films and books are to a great extent means of transmitting fact, fantasy and ideas. Digitally speaking, the amount of data transmitted by one frame of a TV program makes the capacity of the average micro look pretty sick. The micro can only score in its ability to do some very complicated juggling acts with its miserly portion of data and to do it in an interesting and interactive way. The programmer must attempt to extract and crystallise the essentials of his material, and choosing a suitable link-up gets harder as the choicest tit-bits get snapped up. The 'Hobbit' for example, is a highly convenient A to B and back to A adventure; Daley Thompson runs and jumps about and throws things (to put it graphically); and Popeye goes about hitting people (only the nasty people of course!).

Programmes like 'Minder' however, introduce major complications, being originally conceived as 'fragments of the rich tapestry of human life shot through with subtle threads of humour and compassion' (how I love Readers' Digest!). That's laying it on a bit thick but you'll know what I mean. If the computer program doesn't display at least some of this richness and variety; if it can't portray characters with at least some resemblance to the reality which make its source material successful, then it may as well not be written. Programmers are increasingly stirring into their Zap, Adventure, Simulation and Puzzle formats, generous portions of Artificial Intelligence. A number of programs are sold with this A.I. aspect heavily promoted. I'm not sure, incidentally, what A.I. really is. Aren't all computer programs displays of

varying degrees of Artificial Intelligence? What *is* being forced upon programmers, and the link-ups play a significant part here, is the use of this so called A.I. to make the program seem not so much more intelligent, but friendlier and more human in it's interaction with the user. And indeed, why not? This is, I feel, not merely a passing fad but one which will develop as programmers master the techniques and micros get faster access to larger memories.

What, then, of 'Minder'?

"Ere, Arfur, cop a load o' this.'

'Not now, :Tel, can't you see I'm tryin' to do my accounts? And stop tinkerin' with the merchandise; customers don't want goods with dabs on 'em. 'Specially, yours. What is it anyway?'

"Sa new computer game, innit?'

'Nothin new in that; I've shifted more o' them than you've had 'ot dinners. Picked up a job lot the other day. Space Invaders. The latest. There's a tidy markup to be made on smoothware.'

'Software, Arfur, it's called software.'

'All right, all right; your gettin' worse than 'er indoors.'

'Oy, look 'ere, it's me!'

'Wot, on the telly, 'ere let's have a butcher's . . . My Gawd, so it is! Bit small but definitely you . . . and there's the Winchester Cluband Dave . . . and Charlie whatisname, you know, 'im who's just got back from a five year 'oliday. What are you doin' now?'

'I'm negotiating wiv this geezer for some colour tellies. I've knocked 'im down to forty sovs but 'e's stickin' like glue.'

'Forty, Tel? They must be off the back of a lorry.'

'I'll ask 'im.'

'And?'

'He's come over all moody 'cos I'm knockin' 'is reputation.'

'I can see you need a bit of subtlety 'ere. Move ever, my son, and let an expert loose on 'im.'

'Oh, yeah, and what about the accounts?'

'Computers, Tel, computers. We businessmen have to 'ave technology on our side. I'll do the accounts on here later.'

'I suppose you'll want to get some practise in before you start on the heavy stuff?'

'A very shrewd observation, Terence. Meanwhile, as you've got your hands free . . . There's a van load of Christmas trees outside needs unloadin' . . . '

And a letter from Hilton Computer Services Ltd. with an interesting proposal for software houses.

FREEWARE is a new method of distributing software that enables the computer user to test the product before parting with his or her money. The payment is made in the form of a donation in favour of the copyright holder or original distributor — the user decides on how much to donate according to the value he or she places on the product.

This scheme is already in operation in the USA: HILTON is the first company in the UK to offer software as FREEWARE. We hope that other software producers and users will support the concept. We wish to encourage small software producers, like ourselves, who produce serious programs, to join the scheme. A couple of years ago, it was easy (?) to write a program for a particular application and then just go into the software market and sell it. Now, the software industry has started to mature and a software publisher has to spend large sums to promote a product before a single copy is sold.

Small software producers (SSP!) can unite under the FREEWARE scheme and survive. We can support each other by distributing lists of FREEWARE suppliers with the products we send to users; perhaps have a group advertisement in all major magazines (attention AD. Manager).

HILTON has been operating the FREEWARE scheme for two months and we have received good support and encouragement from users who have requested our PERSONAL BANKING SYSTEM. We have already found that we are able to supply this program at a cost much less than previously advertised price, and still keep in business (although someone did only send us 60p!).



We feel that there must be many good or excellent programs (like ours!) which are otherwise not available or not sufficiently promoted. We want to readdress the balance. If any computer users or small software producers are interested in the scheme, we shall be more than pleased to hear from them.
JACK GIBBONS
Managing Director
Hilton Computer Services Ltd
14 Avalon Road,
Orpington, Kent BR6 9AX

NOTE: The PERSONAL BANKING SYSTEM is available for ZX81 (16K), SPECTRUM (48K), DRAGON 32/64, BBC (32K), 50p is required for post and packing.

Sinclair News

After the Spectrum+ we wait with baited breath for the next major onslaught from Sinclair Research. Rumours abound about a cut down QL version, or a linked flat screen TV and portable computer, but no doubt, as usual, the product will have some surprises and some accentricities.

With Sinclair always a leader in the price war I am surprised that, as yet, no reduction has been made to counter the drop in prices of other machines. Sinclair say that taking into account the value of the software pack (£50+) this makes the Spectrum+ competitive, however dropping the price by £50 on both the Spectrum and Spectrum+ instead would really get them back into the lead. As usual, in the time which passes between the writing and the publishing of comments such as these, something on these lines may have happened!

OUT WITH THE OLD . . . (Hold the front page!)

At the end of January (after the above piece had already been written), Sinclair Research announced that they would cease production of the original Spectrum 48K, whilst simultaneously cutting the price of the new model Spectrum+ from £179.95 to £129.95 (including VAT). So, the Spectrum+ has now in effect replaced the original Spectrum.

Possibly referring to the price cutting measures of Atari, Sir Clive Sinclair remarked — "The home computer market is currently entering a very vigorous phase and we anticipate strong competition from US manufacturers in particular."

While stocks of the original Spectrum last, Sinclair will no longer be recommending a retail price for it, so this may well lead to a bout of discounting in shops. The introductory software Six-Pack which was previously included in the £179.95 price tag of the Spectrum+, will no longer be available free, but can be bought for the price of £14.95 if purchased at the same time as the computer. The Six-Pack, including Tasword II, Tiny Touch 'n Go, Return of The Jedi Deathstar Battle, Scrabble, Chess and VU-3D, are worth £66.70.

Owners of the original Spectrum now have the option of sending their computers to be upgraded with a Plus keyboard by Sinclair Research (cost £30), or to purchase an upgrade kit and do it themselves (cost £20). These kits (available only from Sinclair) can be obtained from:
Sinclair Research Ltd
Stanhope Rd
Camberley
Surrey GU15 3PS

Meanwhile

Software seems to be getting more attention from Sinclair, with three new names appearing on the Sinclair payroll, all involved with this side of the market.

Mike Leadbetter has joined as business software editor and is primarily concerned with QL business software. Chris Clifton is the educational software editor for all machines and also has responsibility for language developments such as LOGO and PROLOG, and finally, Andrew Cummins is the "software engineer" who will be supporting software houses developing software for Sinclair, primarily QL, though Spectrum software is also encompassed. ▶



Education cuts?

The five Learn To Read programs are now available at £7.95 instead of £9.75 or, as a bundled "Foundation Pack" of all five for only £19.95. The Blackboard Software range consisting of Early Punctuation, Speech Marks, the Apostrophe, Capital Letter, Alphabet Games and Castle Spellerous have all been reduced from £7.95 to £4.95.

Finally, the four Science Horizon titles, Cargo, Glider, Survival and Magnets all drop to £7.95 from £9.95. All of these were very favourably reviewed by Mike Edmunds and would now seem to represent excellent value for money, perhaps Sir K. Joseph should take note!!!

. . . AND INTRODUCING

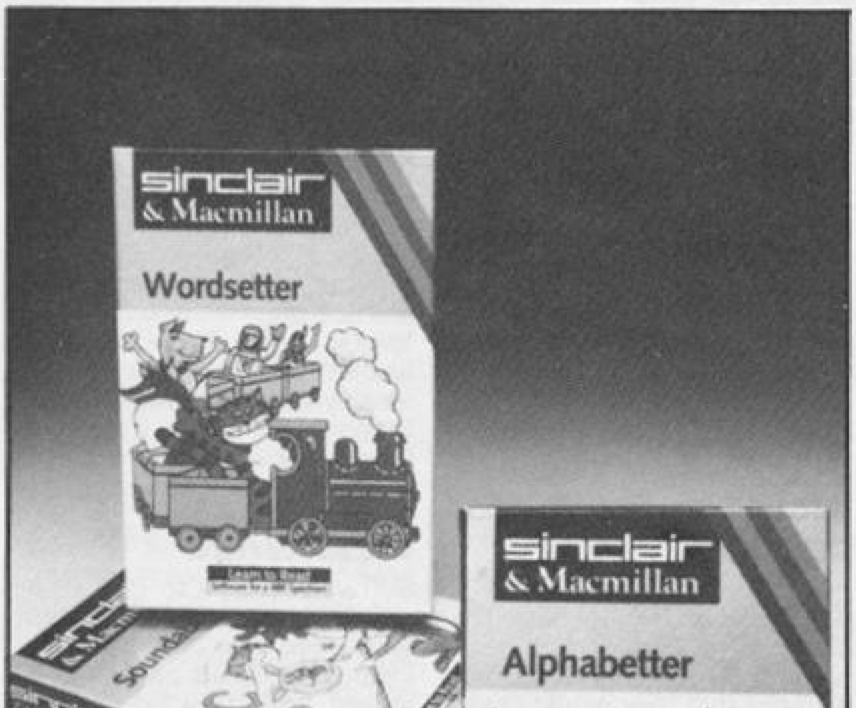
Fifteen, yes folks count 'em, FIFTEEN new educational titles for any Spectrum. Enough to make teachers drool and wish they'd never got that Beeb! Two good "sneaky teaching" programs (programs which look like a game but have an educational content) are Estimator Racer and Number Painter, these are both math skills based and aim to "sharpen the user's mental ability". Anything which takes the tears out of learning seems like a good thing. These are £4.95 each.

Thirteen programs are published in conjunction with the Macmillan Publishing Group, all for the 48K, and all at £7.95. These consist of four further Science Horizons simulation programs written by Five Way Software and are Oil Strike, Weathermaster, Planet Patrol, and Disease Dodgers'. Five further "Learn to Read" programs by Fisher Marriot Software, Alphabetter, Soundabout, Bodyswap, Spellbox and Wordsetter. And finally, four in a new range featuring MacMan — "a canny Scot who takes children on fun packed maths adventures." These were written by Intelligent Software. We'll get our tame teacher to review them as soon as possible!

Not only

Spectrum programs but also one of the first non-business QL programs to emerge is their QL Chess. I saw this one at a recent Microfair and had to be dragged away from the stand by my wife as I was trying to purchase a QL merely for this program! The outstanding feature is the 3D display and smooth movement, I can't comment on how it plays or any problems it may have as my wife succeeded in preventing me from spending our holiday money on the aforesaid QL. QL chess costs £19.95.





In . . . . Brief

- You may have seen the large adverts for the Brainpower range of software in many computer mags. Now, Collins have bought the rights to this series of programs which their press release claims has received "enthusiastic review" in the computer press. Well, they have not yet seen fit to send us any, so we cannot be enthusiastic, but if they do I'll give them to our reviewer for his assessment.

- British Telecom is providing an information service for prospective computer owners, phone Bradford 722622 to hear a three minute precis of the computer industry.

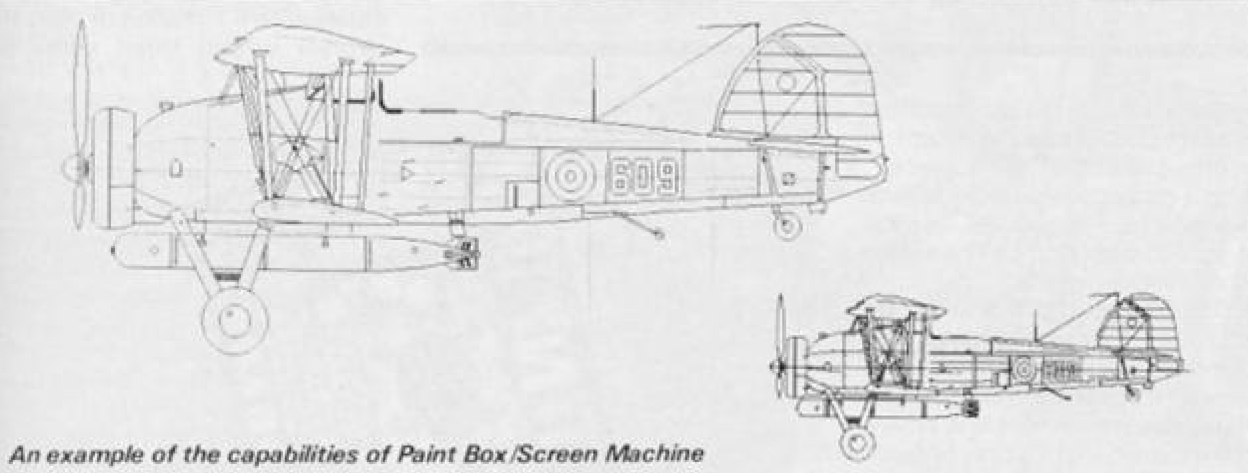
- Saga Systems, makers of the Emperor Keyboard, claim their case is much better than the Spectrum + and the cost is much the same for a normal Spectrum and their unit. I must agree that the Saga is better for typing, but personally find the Spectrum + better for programming. As to looks, each person has their own preferences.

- Mike Cook of "The Micro User" discovered, as I so often do, that some readers take everything literally. A comment that a certain BBC error code meant that the machine was about to explode caused quite a spate of panicking owners to return their machines. Acorn were not amused. Now, ZX owners wouldn't be taken in so easily would they?

- For "Mature Adults" who live in Gwent there is an opportuntiy to expand your knowledge of computing at your own pace. A series of courses and open days are available from the Practical Training Unit. Contact Lyn Delmann, Newport (0633) 51525, Ex 59.

SCREEN MACHINE

Continuing his interest in Computer Aided Design, Colin Christmas looks at another software package



An example of the capabilities of Paint Box/Screen Machine

It has been said that where the Spectrum is concerned, certain people have one track minds. And yes, I have to confess that there are times when my one track mind starts and ends with anything that has to do with the Graphics potential of my Spectrum. So we're all different. But I know I'm not alone. For me, it is one area where my micro becomes a tool and a creative instrument. It enables me to use my imagination both in playing and in creating. Maybe it's the Artist in me, probably it's the child inside all of us.

If you share that fascination and have not yet used Screen Machine from Print'N'Plotter Products, but have already used something like Paintbox, then I have to recommend it. But beware. Prepare to have your mind stopped in its tracks. Or failing that, at least to have your breath taken away. It is one of the best, most powerful and most useful Utilities I have ever seen for the 48K Spectrum. To be honest, it is not for the beginner 'Dedicated Programmer' would be more appropriate. To such a person, who has already used other graphics programming hardware or software, to produce their own work as it were, Screen Machine offers a real opportunity to achieve professional and really impressive results.

It enables such programmers to save time and memory space by having access to instant machine code routines. It is my intention here to give some brief idea of just what that entails. As always, after that it's up to you.

From the very first moment that you set eyes on the package, even if you had not read the adverts, it would be obvious that Screen Machine and Paintbox came from the same stable. And, if you have used Paintbox, then quite simply, Screen Machine is the next step. They go together like — like Torvil and Dean.

For your money you get an instruction book with a cassette. Side Two of the tape is a Demonstration Program and I can recommend starting here. This is a Utility where the Demonstration is useful in the sense that it is more like a 'work out' for the potential user. Except that just for now you are spared actually having to do anything yourself. What you get a chance to see is the Real Thing' and by BREAKing into the program and studying the listing you can see what is being done. What you see first in the Demo Program is a Textscreen. The first Capital letter of the text is 'Illuminated', as they say in some circles. 'All pretty and flowery' as they say in wider circles. This is achieved with small line illustrations and I'm not ashamed to admit that I had to BREAK then and there. The text itself refers to the facilities offered by Screen Machine.

The illustration of the plane in the advert and on the cover of the package comes next. PAINTBOX was used originally for the painting of the plane. Then using the second program on Side One, Screen Machine Two, the drawing was 'Blended' with a program generated mathematical figure and then loaded back into Paintbox for retouching. A drawing of a Zebra is used to stunning effect as an example of the first program, Screen Machine One, and its most easily used function. Namely, that of Compressing Screen Graphics. In this case, if it had been saved as a normal SCREEN$ then 6912 bytes would have been used. Screen Machine One automatically stores this as Machine Code in only 2475 bytes.

The final part of the Demo Program is the most impressive. — three horses galloping. A fascinating example of screen animation, and tantalising details of how it was done are given, as with the other two examples, in the notes covering the Demo Program in the Instruction Book. Needless to say, Paintbox was used in the early stages of the work for this one too. The Instruction Book incidentally, is necessarily more technical and therefore more complicated than might at first be expected. This applies primarily to the first and last of the programs on side one of the cassette. To get the most out of these and their relevent sections in the instruction book, a good working knowledge of both BASIC and the Manual for the Spectrum is a necessary qualification. Unfortunately, there are a few spelling mistakes in the book and these can be annoying. As well as comprehensively covering all aspects of the programs and utilities, even the demo, offered in SCREEN MACHINE, the Instruction Book also has a short appendix with details to enable you to have the bottom two lines of the screen in any colour. And a section with details and instructions for adapting SCREEN MACHINE to Microdrive.

After LOADing, on Side One of the tape, a title page and Index appear giving the option of three separate programs: Screen Machine One — The screen Graphics Compressor also enabling the creation of Multiple Screen Files and Flip Screen Animation. Screen Machine Two — The Screen Graphics Processor enabling the manipulation of previously drawn SCREEN$ Files. The Menu of Five Options includes LOADing SCREEN$ Files from tape into two permanent Memories, and saving SCREEN$ to tape. Option three, called Drawing Board, is the most exciting and easy to use of all the facilities offered in this package. Stored SCREEN$ can be called for viewing; current SCREEN$ can be stored in memory; a SCREEN$ from one of the two memory files can be superimposed over the screen being worked on; chosen portions of the screen can be enlarged or reduced in stages by a factor of two each stage; mirror images made; INK, PAPER and BRIGHT combinations can be changed; alternate third screen sections can be inversed; and Scrolling, using Cursor Keys.

Finally there is String Machine — the Compiler. All text, graphic characters and UDGs, along with their attributes, can be compiled into machine code blocks, and recalled to the screen by one RANDOMISE USR command. Again, the four options offered in the Menu are well covered in the Instruction Book.

There are no two ways about it. If by this stage you are still with me, then you are going to have to find out more for yourself, and I can only think of one way of doing that. I can recommend it.

(Since this article was written, Print 'n Plotter have told us that Paintbox has been redesigned, with more than 20 new features, and renamed Paint Plus. This is priced £9.95, and Screen Machine at £8.25, and both packages are available from Print 'n Plotter Products, 19 Borough High St, London SE1 — Ed.)

The ZX81 soft selection

Nick Pearce casts his eye over some new releases.

Tiny LOGO Computer Magic

Tiny LOGO is an implementation for the ZX81 of the popular Massachusetts Institute of Technology programming language called LOGO, adaptations of which are now available for many personal computers. The principles of LOGO were described by Tim Hartnell back in the April/May issue of *ZX Computing* and a LOGO translation program for the Spectrum, "Slogo", by David Nowotnik was presented in the following three issues. Briefly, LOGO was designed to provide an introduction to computer programming with particular emphasis on simplicity and the development of logical thinking. The most familiar aspect of LOGO is "turtle graphics", whereby a "turtle" on the screen moves according to the programmer's commands. As it travels, it leaves behind a trail, and in this way pictures can be created by telling the turtle where to go.

The turtle in Tiny LOGO is a pixel. This caused me some difficulty, since there is no indication on screen of the direction the turtle is facing. The trail left by the turtle is also in pixels, so picture resolution is limited to the ZX81's 63 × 43 screen pixels. Another problem is that the program runs rather slowly. there is a pause during which the screen is blank in between executing each command, and I think the slowness would be frustrating were the program to be used for extended periods. The program is written entirely in BASIC, ideally a LOGO translation program should be written in machine code to give a faster operating speed.

In other respects the program is very good with a comprehensive set of turtle graphics commands as well as more advanced procedures (the language works by defining sequences of steps called procedures which are then called and executed). There is an editing facility so that procedures can be easily modified or corrected. These are kept in an area called the "workspace", which can contain up to fifteen procedures. Procedures, as well as screen displays, can be saved on cassette.

There is no shorthand in Tiny LOGO, all commands have to be typed in full, which can be somewhat time consuming. The cassette comes complete with a well-written instruction booklet which explains the language by means of short example programs and contains two useful appendices — a command summary table and an explanation of the program's error reports.

LOGO has been described as the language of the '80s. It is beginning to be used in school classrooms, and whilst Tiny LOGO on the ZX81 has some shortcomings, it would nevertheless be a worthwhile investment for children with access to a 16K ZX81 just starting their computer education.

Tiny LOGO by Computer Magic is published by International Publishing and Software Inc. 3948 Chesswood Drive, Downview, Ontario, Canada. M3J 2W6.



Home Heating Calculations Harlequin Computing

This program calculates the savings in heating costs for roof and cavity wall insulation, double glazing and draught-proofing. It is designed to enable the home owner to decide whether insulation is an economic proposition for his particular property, and the type of insulation he would do best to install. The program is easy to use. Once LOADed, the user is faced with a menu of five options. These enable the user to calculate: the total annual heating cost for a property; the average annual savings possible with roof or wall insulation, double glazing or draught-proofing; the cost of installing the insulation; payback period in years; and the percentage return on the investment. For each option, the user is prompted to enter roof, wall and window areas and "u"-values, and other pertinent information. Typical values are given for terraced, detached and semi-detached houses, but the user is recommended to use actual values from measurements where possible. When all the required data have been entered the answer for the selected option is calculated and displayed on screen. A simplified graph may also be drawn.

The package includes a comprehensive instruction manual which contains a considerable amount of useful information on home insulation. I have just two criticisms. The same data has to be keyed in for different menu options, so it would make the program quicker to use if the data tables were transferable between options; and the program may not be readily usable with "unusual" properties (for example a house already part double glazed, or, as in my cottage, where the upper story is of different construction to the ground). Nevertheless, **House Heating Calculations** is an excellent package and would be a worthwhile investment for a home owner considering insulating his property.

Harlequin Computing are at 18 Heywood Road, Great Sutton, South Wirral.

EURO AIRWAYS and STOCKMARKET G. Barker

Euro Airways and **Stockmarket** are both games of strategy for the 16K ZX81.

The aim of Euro Airways is to either earn £1 million or own 10 aircraft within three years of becoming chairman of the company, and before going bust, being sacked, or forced to resign. You start with assets of £50,000, no aircraft but with a rented hanger at Heathrow and a new licence. To turn £50,000 into £1 million in three years is a tall order. Indeed, it is difficult to make any profit at all, so high are the various operating costs of Euro Airways and considering the inevitable disasters that befall the airline each season.

The game progresses through each season of the three years, and for each session goes through various phases. Firstly you must decide how many aircraft to charter (up to ten), and crew levels and pay. Low crew levels can lead to flight cancellations, and low pay to strikes, so careful thought is required in setting these parameters. You must then decide to which of 25 major cities your aircraft will fly. Certain information is provided to help in making a good choice, such as fuel costs for each flight, and the average ticket price on other airlines. The next step is to decide on ticket prices, and take out an insurance policy. From then on, you're in the hands of chance and the results of the business decisions you make. Hazards are numerous, I suffered two crashes in my first two seasons, and aircraft may be sabotaged, hijacked, flights

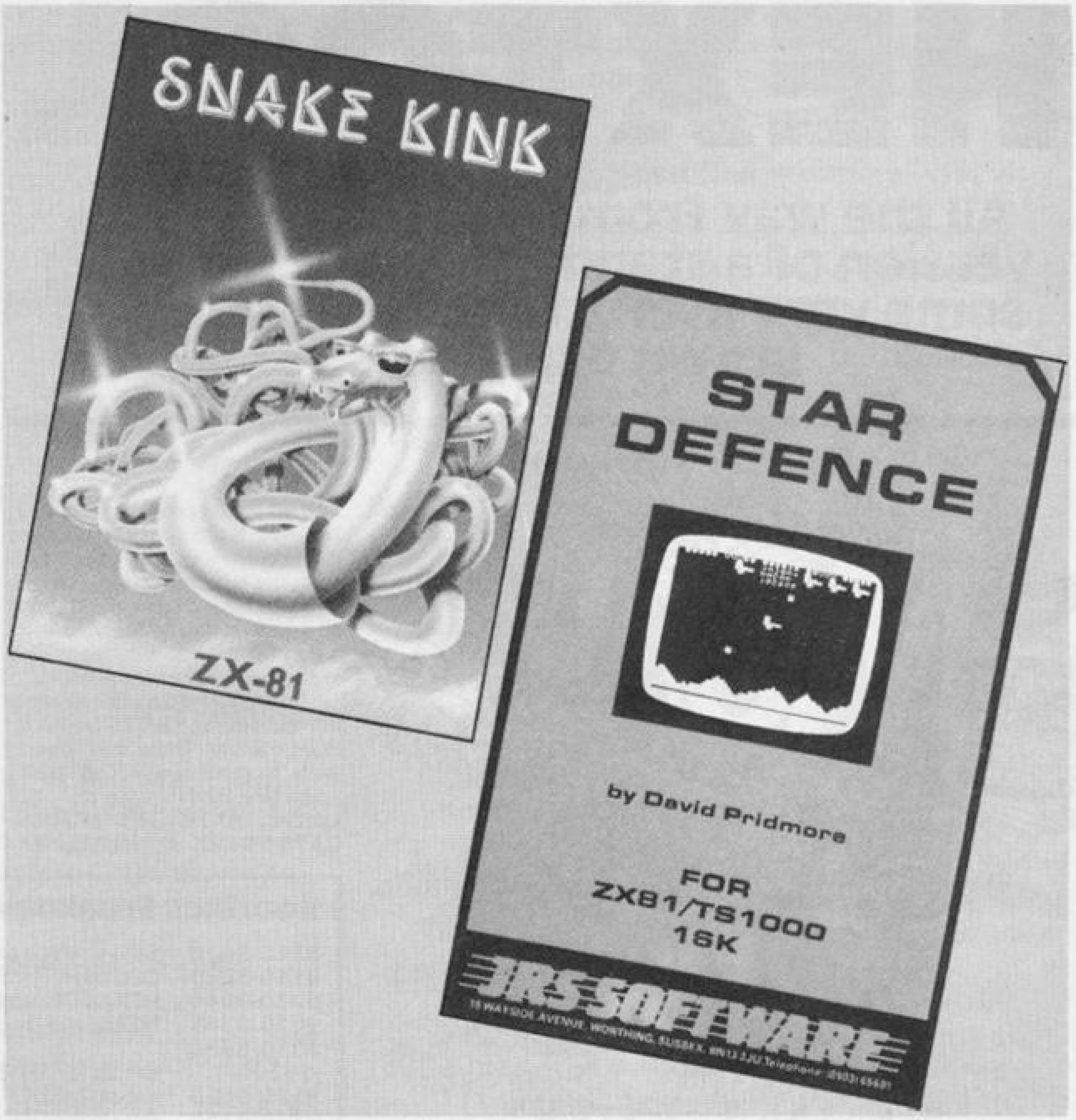
cancelled by bad weather, and so on. There are occasional opportunities to purchase aircraft from other airlines, and take-over bids. The season closes with a full report of your financial position, and at this point a SAVE game facility may be chosen.

Euro Airways is a reasonable simulation. Keying-in crew numbers, wages, destinations and ticket prices for each flight can become a little tedious, but on the whole the game is enjoyable.

Stockmarket is similar in concept — you run a small investment firm on the Stock Exchange with the objective of turning £ ½ million capital into £10 million. Each week as you trade in stocks and shares you receive various telex messages, usually announcing that a company is in difficulty or spreading rumours of an impending disaster, and occasionally a news flash. The aim is to make a fortune by selling shares at a higher price than you paid for them, so you need to keep a careful eye on form as indicated by the telex messages and price movements. That £10 million is pretty elusive as any profit you do manage to make is quickly reduced by weekly expenses of rent, rates, telex facilities and staff salaries.

Both Euro Airways and Stockmarket are easy to play. They are mainly textual games although Stockmarket does contain a full screen map display during news flashes. These cassettes are enjoyable to play, with plenty of interest and good value for money.

Euro Airways and Stockmarket cost £2.80 each and are available from Gavin Barker, 12 Fleming Field, Shotton Colliery, County Durham.



SNAKE KINK
Innelec No Man's Land

No Man's Land is a French software house which has produced a number of micro programs, specialising mainly in software for the Oric. Snake Kink is their first game for the ZX81.

The object of the game is to steer a snake around an orchard eating apples as you go. The apples appear singly, at random, but if you exceed the time limit for eating apples three extra ones appear. As usual, there are complications, each apple eaten by the snake makes it grow longer, and as you dash around the orchard it is only a matter of time before the snake hits its own tail, or the boundary of the orchard, which means instant death. You have three snakes per game, each apple is worth ten points, and a hi-score facility is included. Once you get ten apples, a door opens and you pass on to a more difficult level.

The game performed well, perhaps a little lacking in interest but nevertheless good fun to play.

Snake Kink is available in the UK by mail order from High Tech Distribution Ltd, Units 1 and 2, Conlon Developments, Watery Lane, Darwen, Lancs.

STAR DEFENCE
JRS Software

Star Defence is a fast moving, arcade type game. As usual, JRS have used their excellent fast-load feature and this game for the 16K ZX81 only takes about a minute to set up.

The object of this game is to defend your ship and planet from marauding aliens. The screen display is good, showing the planet beneath you, your ship — which can move up or down, the aliens and a radar display. This shows the current score, the number and location of the aliens, the number of lives (ships) and "smart" bombs remaining, and the number of bombs dropped by the aliens.

You attempt to blast the aliens with your laser cannon and smart bombs as they swoop around the galaxy, and before they destroy you or the planet's force-field by delivering 20 bombs. You have three lives, and there is a one or two player option. Action is smooth and fast, and the graphics are effective, the shower of debris if you are shot down or crash is particularly good. If you manage to destroy 20 aliens a harder wave appears, each alien is worth ten points. A very good arcade action game.

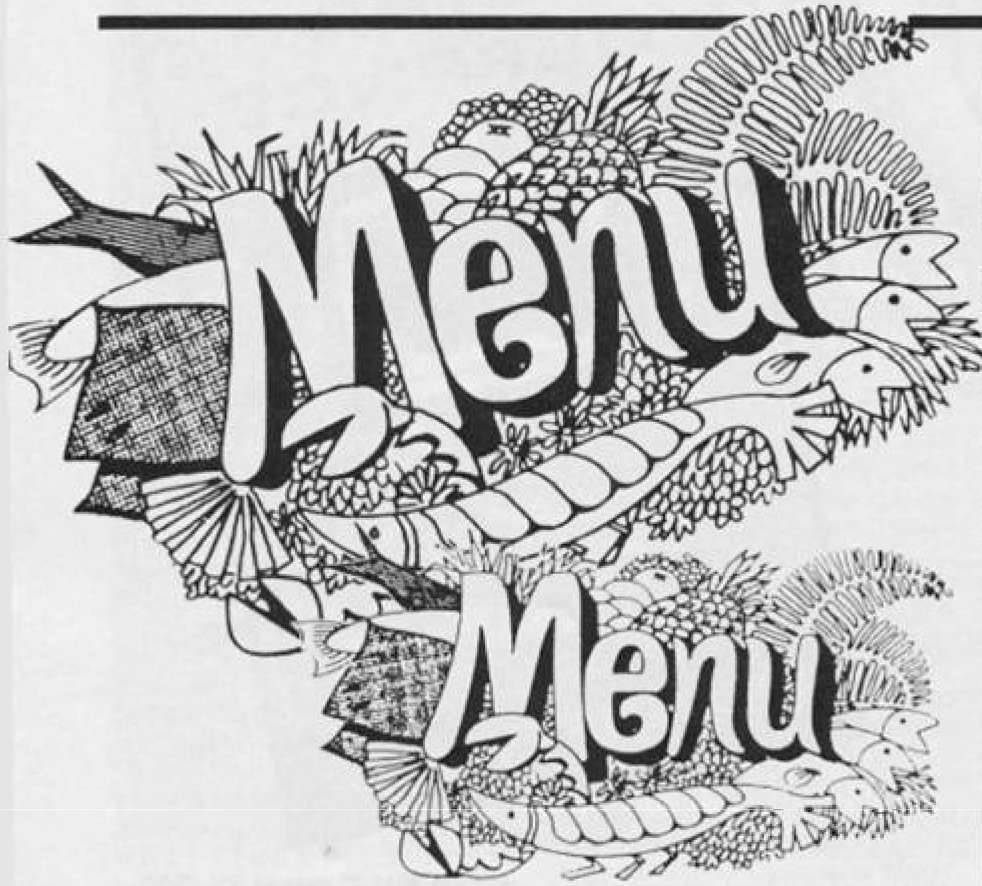
JRS Software Ltd. are at 19 Wayside Avenue, Worthing, West Sussex BN13 3JU.

BOX FILE and SLOT MACHINE
Finsbury

Black marks for Finsbury for these two cassettes. Box File was so badly recorded it would not LOAD, and Slot Machine (a simulated fruit machine game) contained programming errors which prevented it performing correctly. New versions of both cassettes were obtained but I was concerned to find that the problems remained. In the early days ZX81 LOADing difficulties were all too common, but badly recorded software available commercially cannot be excused. I cannot remember getting a cassette which refused to LOAD for a long time. Slot Machine appears to work satisfactorily when first played; however it soon becomes evident that there are inconsistencies, for example, there is no payout for certain winning combinations. Back to the drawing board with these two, I'm afraid, Finsbury. ■

HEXTOOL

All the way from Norway comes this version of a standard utility, but with some very useful extra features. Bob Brown explains . . . .



I've seen many HEX to DEC and visa versa conversions but so far no math in HEX. As I'm beginning to work in machine code, I decided I needed something like that, so I made up this prog.

I've found that is already come in very handy for me, especially in attempting to read published machine code listings. It helps me to understand what is happening to be able to go back and forth between HEX numbers and DEC numbers easily.

I use common HEX to DEC, DEC to HEX algorithms and built on them.

I started out with five separate progs, then decided to make them into one listing. The listing is very compartmentalised and will easily lend itself to being broken back down into the five original separate progs.

It is all MENU controlled. (I like that expression, "menu controlled". . . aren't almost all of us. . . a nice salad, a slab of roast beef, mashed potatoes. . . enough of that for a man on a diet!) The prog is also Aborted from the MENU and one is given a second chance before th final Abort. I've put in an option to hard copy the MENU, but I don't think it would be used much, as one always can return to MENU after each operation.

But, if one finds he needs to save memory, a hard copy of MENU can be made. Then change MENU control number 1 thru 5 to letter variables and use only the letters in MENU display. The following changes will also save memory spaces.

Change line 8820 to "M returns MENU" and delete lines 8830 thru 8870: change line 9630 to read "M returns Menu" and delete lines 9640/50: delete all REMs. Delete the complete SAVE, VERIFY routine and enter manually when needed. Those changes should save a bit of memory spaces, but at present, I like it the way it is.

Chummy

I've made the prog very friendly, I believe. If the cues are followed it will work fine. But I must caution, the cues must be followed.

I used the results of M$ both as a control for the MENU and as a flag for the various operations in the conversion sections.

As mentioned earlier, there is an automatic SAVE-VERIFY-RUN routine. Once it is loaded with 'hextool' it will RUN itself.

In Line 9110, type in. "12, spaces, EXTENDED MODES, CAPS SHIFT 4, MENU, EXTENDED MODE, CAPS SHIFT 0," (Not the commas.) In line 9930 go to EXTENDED/CAPS 2 just before "don't" and EXTENDED/CAPS 0 just after forget.

In the math mode, the ADD and SUB routines will probably be used the most, especially in jump routines. In such a listing as:

7E9A 18A3 JR −5Dh

One would first find DEC equiv. of −A3 equal to −93 (M-2 Mode) then the HEX equiv. of 93 equal to 5 Dh and prefix a-.

Of course an assembler program would probably do all that automatically, but I personally like to know exactly what is happening so eventually I'll have a solid understanding of the intricacies of a process.

I'm glad I worked with it for a while, as a wee bug insidiously crept into the works between the lines and was merrily laying its eggs. But the problem wasn't what I had originally believed it to be. I had merged the hextool with a hexload prog which contained a "DIM A$ (2)" line.

When I tried to load a number into line 9350, which has the

Routines Breakdown

8610-8620	Set variables and lock caps.
8710-8830	DEC to HEX conversion.
8910-9040	HEX to DEC conversion.
9110-9250	MENU and its controls "M".
9310-9530 -9620	Set up for −HEX to −DEC "2".
9520-9620	Set up for HEX to DEC "3".
9710-9750	Set up for DEC to HEX "4".
9810-9850	Set up for −DEC to −HEX "5".
9900-9970	End module "Z".

Assigned Strings

A$	First HEX number for math.
B$	Second number for math.
G$	Decimal number for DEC to HEX in string form.
H$	HEX number for HEX to DEC.
J$	Assigned HEX numbers and letters.
M$	Menu control and flags.
S$	String version of DEC in Math routine.
U$	- sign.
V$	Holds H$ for future use.

Variables

1 thru 5	Work areas from Menu.
C	Code of H$.
D	Work number, DEC to HEX.
E	First DEC number, DEC to HEX.
F	Second DEC number, DEC to HEX.
G	Decimal results, math.
H	Work number, DEC to HEX.
L	Work number, DEC to HEX.
M	MENU.
P	Control number, HEX to DEC.
R	Work number, DEC to HEX.
T	Decimal number, HEX to DEC.
Z	Abort.

variable string A$, the last two digits of the number were truncated. It appears that I had set up a "conflict of interest" between the two programs. One must watch when merging one prog with another to a certain that there are no conflicts between assigned variables. I've never seen that detail listed in anything I've read, so I though I'd mention it. In hindsight it is obvious, but if one doesn't think of it beforehand, some weird results can emerge.

I like the "PRINT #1" routine to put cues into the edit lines, and have used these in the prog.

I get more fun out of trying to program than playing games, so this type of thing suits me. I hope the prog will be of use to a lot of novice programmers such as myself.

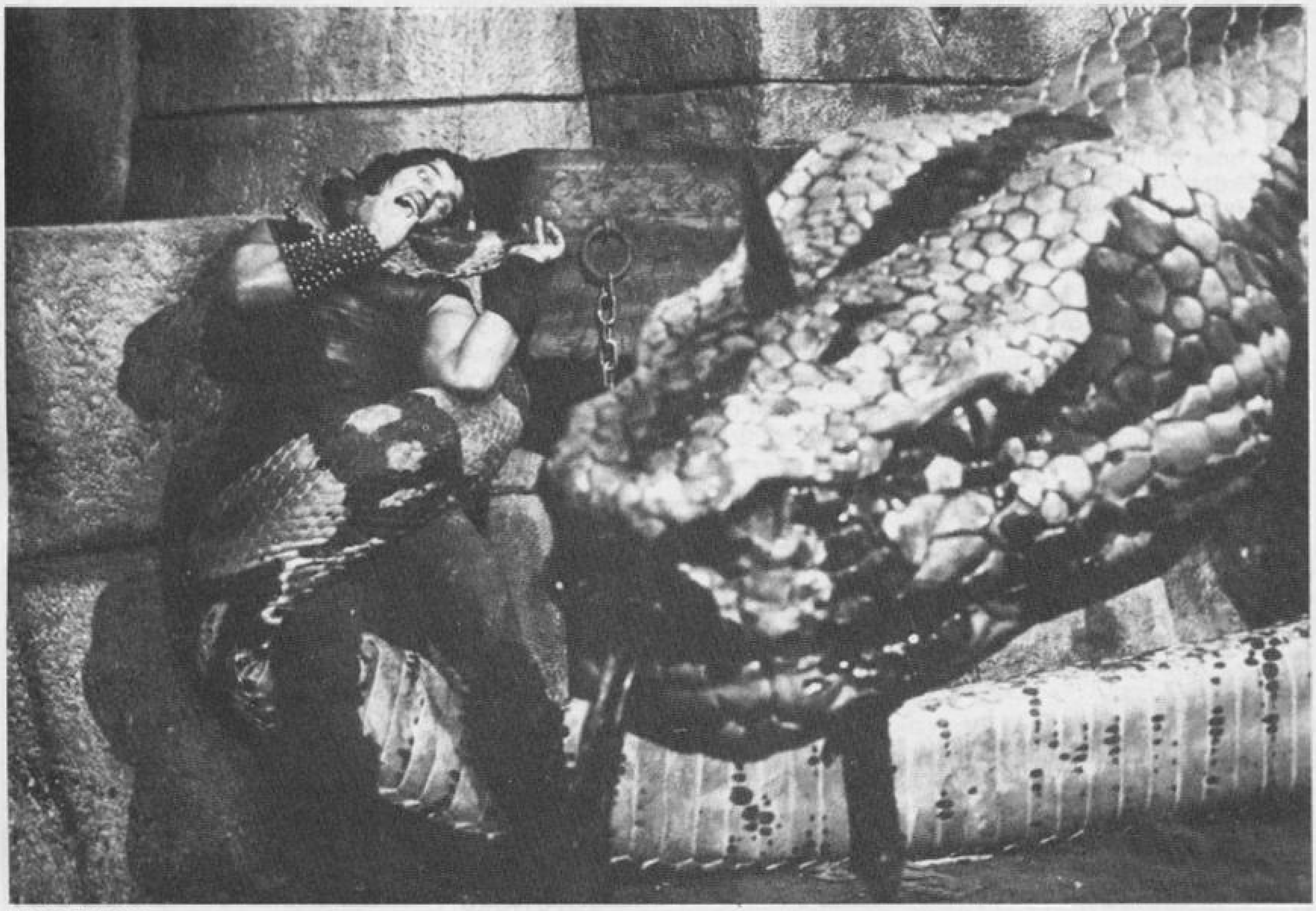
That's all, happy programming!

```
8601 REM hextool
8603 REM Hex math, DEC <> HEX
8607 REM *Set variables & lock c
aps
8610 PAPER 7: INK Ø: CLS : POKE
23658,8
8620 LET M=911Ø
8630 GO TO M
8701 REM *dec to hex
8710 LET V=G
8720 LET U$=" "
8730 LET S$=STR$ G: IF S$(1)=U$
THEN  LET G=65535+G
8740 IF G>65535 OR G<Ø THEN  PRI
NT "Try again. Out of range.": I
F M$="1" THEN  GO TO 931Ø: IF M$
="2" THEN  GO TO 951Ø: IF M$="4"
 THEN  GO TO 971Ø: IF M$="5" THE
N  GO TO 981Ø
8750 LET J$="Ø123456789ABCDEF"
8760 LET D=INT (G/4Ø96): LET R=G
-4Ø96*D: LET E=INT (R/256): LET
R=R-256*E: LET H=INT (R/16): LET
 L=R-16*H
8770 LET G=V
8780 IF M$="1" OR M$="4" THEN  P
RINT "DEC ";G;" = ";: GO TO 881Ø
8790 IF M$="5" THEN  PRINT "DEC
";VAL G$;" = HEX ";J$(D+1 TO D+1
);J$(E+1 TO E+1): GO TO 882Ø
8800 PRINT A$+W$+B$;" HEX = ";
8810 PRINT J$(D+1 TO D+1);J$(E+1
 TO E+1);J$(H+1 TO H+1);J$(L+1 T
O L+1);" HEX"
8820 PRINT #1;AT Ø,Ø;"Need routi
ne agaain? MENU numberAny other
key to return to MENU": PAUSE Ø
8830 PRINT : IF INKEY$="1" THEN
 LET M$="1": GO TO 931Ø
8840 PRINT : IF INKEY$="2" THEN
 LET M$="2": GO TO 951Ø
8850 PRINT : IF INKEY$="3" THEN
 LET M$="3": GO TO 952Ø
8860 PRINT : IF INKEY$="4" THEN
 LET M$="4": GO TO 971Ø
8870 PRINT : IF INKEY$="5" THEN
 LET M$="5": GO TO 981Ø
8880 CLS : GO TO M
8901 REM *hex to dec
8910 LET H$=A$: GO TO 894Ø
8920 LET H$=B$
8930 IF A$=B$ THEN  LET F=E: RET
URN
8940 FOR P=LEN (H$)-1 TO Ø STEP
-1
8950 LET C=CODE (H$(D TO D)): LE
T D=D+1: IF C>=48 AND C<=57 THEN
  LET C=C-48: GO TO 9ØØØ
8960 IF C>=65 AND C<=7Ø THEN  LE
T C=C-55: GO TO 9ØØØ
8970 IF M$="1" THEN  PRINT "Try
again, out of range.": PAUSE 5Ø:
 CLS : GO TO 931Ø
8980 IF M$="2" THEN  PRINT "Try
again, out of range.": PAUSE 5Ø:
 CLS : GO TO 951Ø
8990 IF M$="3" THEN  PRINT "Try
again, out of range.": PAUSE 5Ø:
 CLS : GO TO 952Ø
9000 LET T=T+C*16^P
9010 NEXT P
9020 IF M$="2" OR M$="3" THEN  R
ETURN
9030 IF H$=A$ THEN  LET E=T: RET
URN
9040 IF H$=B$ THEN  LET F=T: RET
URN
9101 REM *MENU & its controls
9110 PRINT "               MENU"
9120 PRINT '"1 Add, sub, mult &
div positive   HEX integers.   I
n case of"'"  addition or multip
lication"'"  results up to +";CH
R$ 8; OVER 1;"_"; OVER Ø;"65535
usable."'"  In division, if a de
cimal is"'"  in the answer, it w
ill round"'"  out the same as th
e INT"'"  Command.  Format HEX (
)ØØØØ"
9130 PRINT '"2 HEX FF-8Ø (-ØØXX)
 to  DEC"''"3 HEX to DEC"''"4 DE
C to HEX"''"5 -DEC to HEX FF-8Ø
for"''"M to return to MENU:  Z t
o Abort"
9140 PRINT #1;AT Ø,Ø;"Do you wan
t hard copy of menu?  (Y/N)": PA
USE Ø: IF INKEY$="Y" THEN  COPY
9150 PRINT #1;AT Ø,Ø;"Please ent
er choice of menu now       ": PA
USE Ø: LET M$=INKEY$: CLS
9160 IF M$="1" OR M$="2" OR M$="
3" OR M$="4" OR M$="5" OR M$="M"
 OR M$="Z" THEN  GO TO 918Ø
9170 GO TO 911Ø
9180 IF M$="1" THEN  GO TO 931Ø
9190 IF M$="2" THEN  GO TO 951Ø
9200 IF M$="3" THEN  GO TO 952Ø
```

```
9210 IF M$="4" THEN  GO TO 9710
9220 IF M$="5" THEN  GO TO 9810
9230 IF M$="M" THEN  GO TO M
9240 IF M$="7" THEN  GO TO 9250
9250 GO TO 9900
9301 REM *Set up for MENU select
 1
9310 PRINT "HEX math to +";CHR$
8; OVER 1;"_"; OVER 0;"65535. R
emember  sometimes need to add
1 to     answer. i.e.: 581Fh-58
00h=31d;  but 32";CHR$ 8;CHR$ 8;
 OVER 1;"__"; OVER 0;" spaces in
 a line": PRINT
9320 INPUT "Enter +, -, * or / "
;W$: IF W$="+" OR W$="-" OR W$="
*" OR W$="/" OR W$="M" THEN  GO
TO 9340
9330 GO TO 9320
9340 IF W$="M" THEN  GO TO M
9350 LET D=1: LET T=0: INPUT "En
ter first HEX number ";A$: IF A$
="M" THEN  CLS : GO TO M
9360 GO SUB 8910
9370 INPUT "Enter second HEX num
ber ";B$: LET T=0: LET D=1: IF B
$="M" THEN  CLS : GO TO M
9380 GO SUB 8920
9390 IF W$="*" THEN  LET G=E*F
9400 IF W$="/" AND F=0 THEN  PRI
NT "Divisor = 0.  No good!": GO
TO 9320
9410 IF W$="/" THEN  LET G=E/F
9420 IF W$="+" THEN  LET G=E+F
9430 IF W$="-" THEN  LET G=E-F
9440 PRINT A$+W$+B$;" HEX = ";G;
" DEC"
9450 GO TO 8710
9501 REM *Set up for MENU select
, 2
9510 PRINT " HEX FF-80 to -DEC U
se -00XX    format ONLY!": GO TO
 9540
9511 REM *Set up for MENU select
 3
9520 PRINT "HEX to DEC 0000-FFFF
 ONLY!"
9530 INPUT "Enter HEX, ((-)XXXX)
 format.  M returns MENU ";H$
9540 LET T=0: LET D=1: IF M$="2"
 THEN  INPUT "Enter HEX -00XX fo
mat ONLY.   M returns Menu ";H$
9550 IF H$="M" THEN  CLS : GO TO
 M
9560 LET V$=H$
9570 LET U$="-"
9580 IF H$(1)=U$ THEN  LET H$=H$
(2 TO LEN H$)
9590 GO SUB 8940
9600 IF V$(1)=U$ THEN  LET H$=U$
+H$: LET T=T-65536
9610 IF M$="2" THEN  LET T=T+652
80
9620 PRINT "HEX ";H$;" = ";T;" D
EC"
9630 PRINT #1;AT 0,0;"Need routi
ne again? Pick 2/3,   Any other
key to return to MENU": PAUSE 0
9640 PRINT : IF INKEY$="2" THEN
 LET M$="2": GO TO 9510
9650 PRINT : IF INKEY$="3" THEN
 LET M$="3": GO TO 9520
9660 CLS : GO TO M
9701 REM *Set up for MENU select
 4
9710 PRINT "DEC to HEX 0-65535 O
NLY! "
9720 INPUT "DEC in.  M returns M
ENU ";G$: IF G$="M" THEN  CLS :
GO TO M
9730 IF VAL G$< 65535 OR VAL G$>
65535 THEN  PRINT "Try again, ou
t of range.": PAUSE 50: CLS : GO
 TO 9710
9740 LET G=VAL G$
9750 GO TO 8710
9801 REM *Set up for MENU select
 5
9810 PRINT "-DEC to HEX FF-80 ON
LY!"
9820 INPUT "Enter DEC -1 to -128
. M returnsMENU ";G$: IF G$="M"
 THEN  CLS : GO TO M
9830 LET G=VAL G$
9840 LET G=G*255
9850 GO TO 8710
9900 CLS : PRINT "Do you want to
 go again? (Y/N)": PAUSE 0: IF I
NKEY$="Y" THEN  GO TO 8610
9910 CLS : PRINT "Fine, now do y
ou want to SAVE?  (Y/N)": PAUSE
0: IF INKEY$="Y" THEN  GO TO 993
0
9920 CLS : PRINT "OK, thanks & b
ye!": STOP
9930 CLS : PRINT "Set up tape an
d don't forget to remove earplug
.  Any key when    ready": PAUSE
 0
9940 CLS : SAVE "hextool" LINE 8
601
9950 PRINT "Rewimd tape & replac
e earplug for VERIFY.  Any key w
hen ready.": PAUSE 0
9960 CLS : VERIFY "hextool"
9970 PRINT "All right-it's SAVE'
d & VERIFY'd Thanks & bye!": STO
P
```

MANHUNT

Roman Laskowski survives in Catford, can YOU survive the Manhunt?



Program description

Manhunt — the Time-honoured Manhunt of Legend and Fable. Fiend chases Man. Fiend is Large, Ferocious, Swift, Deadly, and Hungry. Man, alas, is not.

You are that man (or, if your Birth was Different, that woman). Unarmed, and not as quick as the Fiend, you must rely on your cunning to escape the Fiend and survive. This assumes, of course, that your Birth bestowed any cunning upon you.

The field of the Manhunt is to be a grid fifteen by fifteen, with grid positions marked by the numbers One to Five. The numbers say how far you may move each go. To make a move, you use a combination of letters and numbers: Letters for directions (L — Left, R — Right, U — Up, and D — Down), and numbers for spaces moved. Upward four spaces, for example, is input as U4; upward two spaces and right one space is input as U2 R1 or, alternatively, as R1 U2.

The Fiend moves after you. It closes in on you, hiding the square it is standing on. Thus, you do not always know whether it will reach you the next go. Your moves score points depending on the squares you are on: 500 for landing on a 1, 400 for a 2, 300 for a 3, 100 for a 4, and, somewhat meanly, −50 for a 5. If three successive moves of yours form a sequence (such as 345 or 432) you earn a bonus 200 points. A further bonus, of 2,000 points, is obtained for making the Fiend disappear. To do this you have to visit the numbers One to Five, three times each. This is your Aim, and your progress towards it is indicated in the top left of the screen.

Needless to say, no bonus points are scored if the Fiend catches you. Instead, you get eaten, and lose 700 points.

Dodging the Fiend is no easy matter, so a hint is given to the uninitiated Runner: Keep moving. Gain ground on the Fiend by fleeing from it along either a vertical or horizontal line, making sure that the Fiend's moves take it to low-value squares while your own moves land you on high-value squares. Try also not to get trapped in the corners or to leave yourself too many low-value targets to aim for.

The world-record score can be altered at line 1000 to record your best runs. The actual world record to aim for is currently 6,850. Incidentally, the Fiend can be any creature of your choice. The game provides six fearsome options: Orc, Troll, Jabberwock, frumious Bandersnatch, Sandworm, and, last but not least, the ravenous Bugblatter Beast of Traal. The end result is much the same whichever Fiend you choose, though some Fiends eat you more politely and more appreciatively than others.

```
 1Ø DIM A(226)
 2Ø DIM B(2)
 3Ø DIM C(5)
 35 DIM CØ(32)
 4Ø DIM FØ(6,21)
 5Ø DIM SØ(7)
 55 GOSUB 12ØØ
 6Ø FAST
 65 CLS
 7Ø RAND Ø
 8Ø LET SEQ=Ø
 9Ø LET HITS=Ø
 1ØØ LET WR=Ø
 11Ø PRINT AT Ø,13-Y;DØ;"HUNT";A
T 16,27;"WR";TAB 27;WR
 12Ø PRINT AT 2,8;"▗▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄
▄▄▄▄▖"
 13Ø FOR I=1 TO 211 STEP 15
 14Ø LET DØ="▐"
 15Ø FOR J=1 TO 15
 16Ø LET K=I+J-1
 17Ø LET A(K)=INT (RND*5+1)
 18Ø LET DØ=DØ+CHRØ (28+A(K))
 19Ø NEXT J
 2ØØ PRINT TAB 8;DØ;"▌"
 21Ø NEXT I
 22Ø PRINT TAB 8;"▝▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀
▀▀▀▀▘"
 23Ø LET I=Ø
 24Ø LET J=INT (RND*15+1)
 25Ø LET K=14
 26Ø LET L=INT (RND*15+1)
 27Ø PRINT AT 3,8+J;NØ;TAB 25;"<
FIEND"
 28Ø PRINT AT 17,4;"YOU>";TAB 8+
L;CHRØ (156+A(21Ø+L))
 285 LET UØ="12345"
 29Ø PRINT AT 2,Ø;"TARGETS";TAB
1;UØ;TAB 1;UØ;TAB 1;UØ;AT 7,26;"
POINTS"
 3ØØ LET UØ="1: 5ØØ2: 4ØØ3: 3ØØ4: 1Ø
Ø5: -5Ø"
 31Ø FOR N=1 TO 21 STEP 5
 32Ø PRINT TAB 27;UØ(N TO N+4)
 33Ø NEXT N
 34Ø GOSUB 8ØØ
 35Ø SLOW
 36Ø PRINT AT 19,Ø;"INPUT YOUR M
OVE:";TAB 2;"XMYN  (WHERE X,Y=L,
R,U, OR D;";TAB 17;"AND M+N<=RAN
GE)"
 37Ø INPUT DØ
 38Ø PRINT AT 19,Ø;CØ;TAB Ø;CØ;T
AB Ø;CØ
 385 PRINT AT 4,25;SØ;TAB 25;SØ;
TAB 25;SØ;AT 9,Ø;SØ;TAB 1;SØ;AT
12,1;SØ;TAB 1;SØ
 39Ø IF NOT (LEN DØ=2 OR LEN DØ=
4) THEN GOTO 36Ø
 4ØØ LET DØ=DØ+"RØ"
 41Ø IF CODE DØ(2)+CODE DØ(4)-56
>A(15*K+L) THEN GOTO 36Ø
 42Ø LET B(1)=Ø
 43Ø LET B(2)=Ø
 44Ø FOR N=1 TO 3 STEP 2
 45Ø LET Z=2-INT (ABS (CODE DØ(N
)-52)/5.75)
 46Ø LET B(Z)=B(Z)+(CODE DØ(N+1)
-28)*SGN COS ((CODE DØ(N)-4Ø)*Ø.
453778)
 47Ø NEXT N
 48Ø IF K+B(1)>14 OR K+B(1)<Ø OR
L+B(2)>15 OR L+B(2)<1 THEN GOTO
 36Ø
 49Ø PRINT AT 3+K,8+L;CHRØ (28+R
ANGE)
 5ØØ LET K=K+B(1)
 51Ø LET L=L+B(2)
 52Ø GOSUB 8ØØ
 525 IF HITS=15 THEN GOTO 2ØØØ
 53Ø LET BEST=2Ø
 54Ø LET P=SGN (K-I)
 55Ø LET Q=SGN (L-J)
 56Ø FOR T=1 TO REACH+1
 57Ø LET X=T-1
 58Ø LET IP=I+P*X
 59Ø LET JP=J+Q*(REACH-X)
 6ØØ IF IP<Ø OR IP>14 OR JP<1 OR
 JP>15 THEN GOTO 68Ø
 61Ø LET R=A(15*IP+JP)
 62Ø LET NEWDIST=ABS (IP-K)+ABS
(JP-L)-R
 63Ø IF NEWDIST<>BEST THEN GOTO
65Ø
 64Ø IF INT (RND*2)=Ø THEN LET B
X=X
 65Ø IF NEWDIST>=BEST THEN GOTO
68Ø
 66Ø LET BEST=NEWDIST
 67Ø LET BX=X
 68Ø NEXT T
 685 PRINT AT 3+I,8+J;CHRØ (28+R
```

```
EACH)
 69Ø LET I=I+P*BX
 7ØØ LET J=J+Q*(REACH-BX)
 72Ø PRINT AT 3+I,8+J;NØ
 73Ø GOTO 36Ø
 8ØØ LET RANGE=A(15*K+L)
 81Ø PRINT AT 3+K,8+L;CHRØ (156+
RANGE)
 82Ø LET SEQ=1Ø*(SEQ-1ØØ*INT (SE
Q/1ØØ))+RANGE
 83Ø LET C(RANGE)=C(RANGE)+1
 84Ø IF C(RANGE)>3 THEN GOTO 89Ø
 85Ø LET HITS=HITS+1
 86Ø PRINT AT 2+C(RANGE),RANGE;"
▯"
 87Ø LET BONUS=Ø
 88Ø IF HITS=1 THEN RETURN
 89Ø LET DIST=ABS (I-K)+ABS (J-L
)
 9ØØ LET REACH=A(15*I+J)
 91Ø IF HITS<15 AND DIST<=REACH
THEN GOTO 2ØØØ
 915 IF HITS>=15 THEN LET BONUS=
2ØØØ
 92Ø LET SCORE=1ØØ*(6-RANGE)-25*
(SGN (RANGE-3.5)+1)*(RANGE-2)
 93Ø PRINT AT 9,1;"SCORE";TAB 2;
SCORE
 94Ø IF SEQ<1ØØ THEN GOTO 1Ø1Ø
 95Ø FOR N=1 TO 3 STEP 2
 96Ø LET TEST=(SEQ+(N-2)*12)/111
 97Ø IF TEST=INT TEST THEN GOTO
1ØØØ
 98Ø NEXT N
 99Ø GOTO 1Ø1Ø
1ØØØ LET BONUS=BONUS+2ØØ
1Ø1Ø IF BONUS>Ø THEN PRINT AT 12
,1;"BONUS";TAB 2;BONUS
1Ø15 IF BONUS=2ØØ OR BONUS=22ØØ
THEN PRINT AT 4,29;"222"
1Ø2Ø PRINT AT 3,25;"SEQ-";SEQ;AT
 17,1;SØ
1Ø3Ø LET A(226)=A(226)+SCORE+BON
US
1Ø4Ø PRINT AT 16,1;"TOTAL";TAB 1
;"▮";A(226);"▮"
1Ø5Ø RETURN
12ØØ LET FØ(1)="ORC"
121Ø LET FØ(2)="TROLL"
1215 LET FØ(3)="JABBERWOCK"
122Ø LET FØ(4)="FRUMIOUS BANDERS
NATCH"
123Ø LET FØ(5)="SANDWORM"
124Ø LET FØ(6)="RAVENOUS BUGBLAT
TER"
125Ø LET MØ="OUNZCCJBVVVFDTOLSMF
UDLQDAZIAAI"
126Ø LET NØ="ALDQJM"
127Ø PRINT AT 5,13;"MANHUNT";AT
9,5;"WHAT ARE YOU?";AT 21,Ø;"PLE
ASE INPUT YOUR IDENTITY"
128Ø PRINT AT 11,14;"MAN";TAB 14
;"WOMAN";TAB 14;"MOUSE";TAB 14;"
OTHER"
129Ø INPUT DØ
1295 IF DØ="" THEN LET DØ="MAN"
13ØØ CLS
13Ø5 LET Y=INT ((LEN DØ-3)/2)
131Ø PRINT AT 5,13-Y;DØ;"HUNT";A
T 9,3;"CHOOSE YOUR FIEND",,
132Ø FOR N=1 TO 6
133Ø PRINT TAB 6;N;"▯▯";FØ(N)
134Ø NEXT N
135Ø PRINT TAB 16;"BEAST OF TRAA
L";AT 21,Ø;"INPUT 1-6"
136Ø INPUT D
137Ø IF D<1 OR D>6 THEN GOTO 136
Ø
138Ø CLS
14ØØ LET NØ=CHRØ (1Ø1+CODE NØ(D)
)
142Ø PRINT AT 1Ø,3;NØ;"▯▯";FØ(D)
143Ø LET EØ=""
144Ø FOR N=1 TO 5
145Ø LET PØ=CHRØ (CODE MØ(6*(N-1
)+D)+127)
146Ø IF CODE PØ=165 THEN LET PØ=
""
147Ø LET EØ=EØ+PØ
148Ø NEXT N
15ØØ RETURN
2ØØØ PRINT AT 3+I,8+J;CHRØ (28+R
EACH);AT 19,15;"AARGH"
2Ø1Ø IF HITS>=15 THEN GOTO 2Ø8Ø
2Ø15 LET SCORE=-7ØØ
2Ø2Ø PRINT AT 19,15;"GOTCHA";AT
3+K,8+L;NØ
2Ø25 LET SEQ=Ø
2Ø3Ø FOR N=1 TO 2Ø
2Ø4Ø PRINT AT 3+K,8+L;CHRØ (28+R
ANGE)
2Ø5Ø PRINT AT 3+K,8+L;NØ
2Ø6Ø NEXT N
2Ø7Ø PRINT TAB 6+L;EØ
2Ø75 GOSUB 93Ø
2Ø8Ø PRINT AT 21,Ø;"WORLD RECORD
 REMAINS UNCHANGED"
2Ø9Ø IF A(226)>WR THEN PRINT AT
21,13;"BEATEN. WELL DONE"
21ØØ STOP
```

Problem page



David Nowotnik answers your questions

Alphabetical order

Dear David,
I have programmed a list of articles in random order, and can interchange to get the lowest in alphabetical order to be first in the list. But I cannot work out how to get the whole list into alphabetical order. Please can you help.

Mrs HG Blackwood,
Fife, Scotland

Dear Mrs Blackwood,
The listing you send me requires little change to complete the sort; using your line numbers, variables and basic routine, here is the complete sort routine:

```
190 FOR i=2 TO n-1
200 FOR k=i TO n
210 IF n$(i-1)  n$(k) THEN
GOTO 250
220 LET t$=n$(k)
230 LET n$(k)=n$(i-1)
240 LET n$(i-1)=t$
250 NEXT k
260 NEXT i
```

CLEARing

Dear David,
Although I have a 48K Spectrum, I sometimes find that a long program will not load after NEWing a previous program. Pulling out the power lead and replacing it is the only way of resetting the machine that I'm aware of. Is there a simpler way?
Clive Williams,
Staines

Dear Clive,
You can reset the Spectrum by using the direct command: RANDOMISE USR 0; this effects the same ROM routine as used by the computer when it is first powered-up. The same command (RAND USR 0) will also 'warm start' the ZX81.

Decimal places

Dear David,
I have recently bought a 48K Spectrum, and wish to employ it to help me with my Open University Maths Foundation course. Can I make the Spectrum work to a fixed decimal place, and preferably a corrected decimal place?

Barry Murfett,
Hyde, Cheshire

Dear Barry,
The answer is 'yes', but it isn't that simple. The Spectrum doesn't have a print formatting command (PRINT USING) available on some other micros, so you have to write a short subroutine to do this. The listing is too long for the Problem Page, so I put it in the post to you. For other readers who want to solve this problem, the strategy for it is as follows:

- *Divide the number into its integer and fractional parts with the INT command.*
- *Multiply the fractional part by 10 to the power of n, where n is the number of decimal places, add .5 (to round it), and take the integer.*
- *Place both halves of the number into strings (STR$), pad out with zeros, as necessary, then combine the two strings with a decimal point between them. Then print the string, or use VAL if you want to work on the number some more.*

Draughts

Dear David,
I am looking for a draughts program for my 48K Spectrum. I have looked through several magazines, but I cannot find any useful program. Do you know of a firm who has such a program?

Fer Soorsma,
Brunssum, Netherlands

Dear Fer,
Forgive the pun, but draughts seems to have been left out in the cold by comparison with that other board game, chess. I must admit, I'm not aware of any good draughts programs for the Spectrum, so, any producer reading this — please let me know if you have a draughts program. You could try modifying the listing in 'Basic Computer Games' by David Ahl for the Spectrum, but I doubt whether that will offer much of a challenge for an experienced player.



Crash!

Dear David,
I'm trying to write a simple machine code routine on the ZX81 which involves places characters on the screen. The program starts to work, but then crashes; what could I be doing wrong?

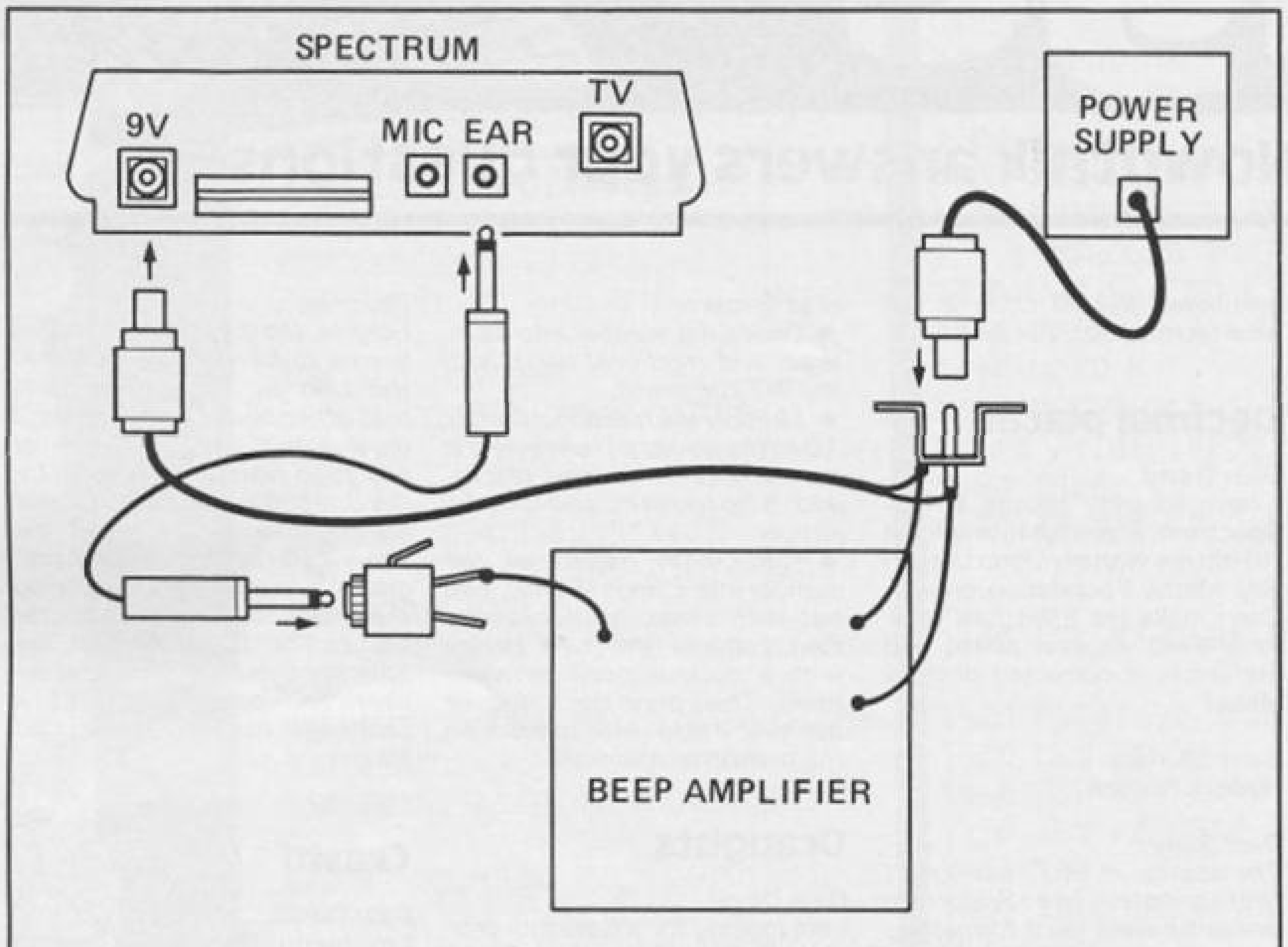
Simon Harrison,
Manchester

Dear Simon,
There are lots of things that could go wrong with your machine code routine, and my machine code series may help. But as your routine actually does something before crashing, then I suspect that you are inadvertently changing the value of the NEWLINE character which exists at the end of each row on the screen — that's always good for a crash!

In the fully expanded display file (with less than 3.5K of RAM the ZX81 contracts the display file to save space), there are 33 characters per row; you've probably overlooked that extra NEWLINE character. ■

BEEP BOOSTER

MP Moore of Newtech Micro Developments Ltd has produced a useful add-on for all DIY fans.



SCHEMATIC INTERCONNECTION DIAGRAM

Here is a simple, inexpensive little piece of equipment for Spectrum users struggling to hear the Spectrum BEEP — a BEEP Amplifier. How loud is the sound from this device? Well, it's more than loud enough to annoy anyone in the same room who's not interested in zapping aliens. . .

No batteries!! The amplifier draws its power directly from the Spectrum power supply (See fig. 1). Includes a volume control and uses a REAL loudspeaker!

The lead from your Spectrum power supply plugs into a 2.1mm power socket, which is connected to the BEEP Amplifier and also a 2.1mm power plug which plugs into your Spectrum 9V power socket. A 3.5mm jack socket connects the EAR or MIC lead from your Spectrum to the amplifier.

The project is available as a kit of parts which includes a ready-drilled case and even a knob for the volume control.

Construction

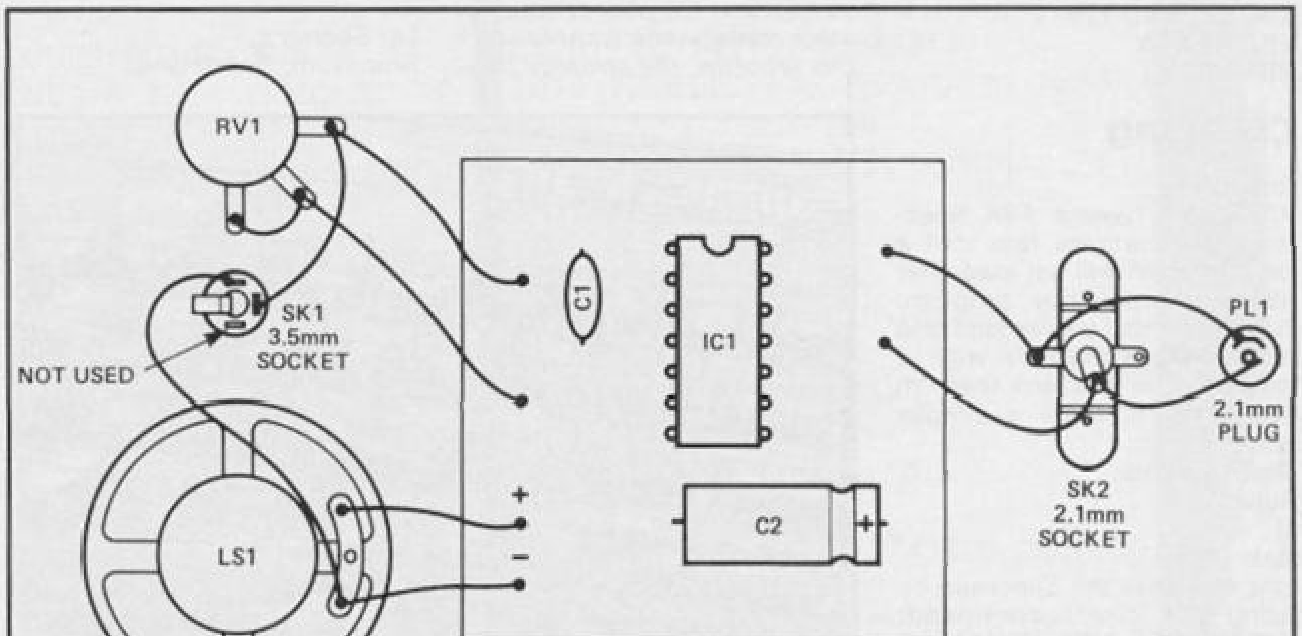
Fig.2 is the component overlay and connection diagram. There are only three components to be mounted on the PCB: these are IC1 (LM380 audio amplifier IC), C1 a 0.1uf ceramic capacitor and C2, a 470uf 16V electrolytic capacitor.

An IC socket is recommended for the LM380 — solder this in first. Plug in IC1 taking care to insert it the right way round. The IC has a notch cut into the plastic at one end, this marks the top end of the IC (see fig. 2). Make sure that all IC pins have gone into the socket and that none have become bent under the IC.

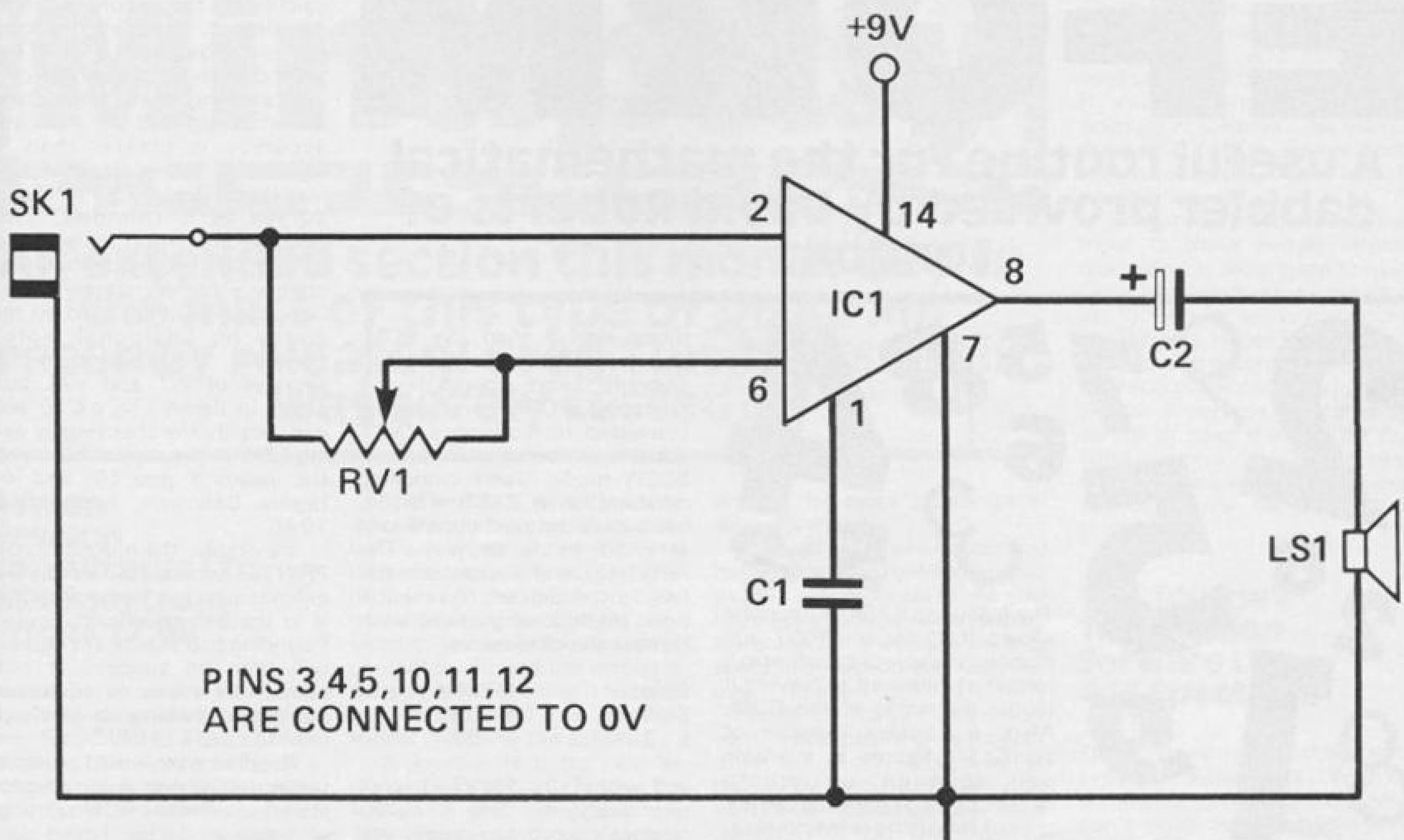
Next, solder C1 in position and finally C2: NOTE that C2 is a polarised component which must be mounted the right way round. Its leads are marked + and/or — to tell you which way round it should go.

Solder the 2.1mm power plug and 2.1mm power socket as shown in Fig. 2. It is essential to wire these up correctly — if you get it wrong you may damage your computer. Don't forget to feed the wires to the 2.1mm plug through its cover before soldering them, otherwise you won't be able to get the cover on.

Connect up VR1 (the volume control), the 3.5mm jack socket and, the loudspeaker, taking care to connect them as shown in Fig. 2. Now, very carefully check all your wiring and make sure that everything is properly



PCB COMPONENT OVERLAY AND CONNECTION DIAGRAM



CIRCUIT DIAGRAM

connected. When you are satisfied that all is well, plug your Spectrum power supply into the amplifier and plug the amplifier's 2.1mm power plug into your Spectrum 9V power socket. Plug in your computer (and TV) and LOAD your favourite arcade game.

Now connect the EAR lead from your Spectrum to the amplifier's 3.5mm jack socket and start annoying the rest of your family. . .

Fig. 3 shows the circuit diagram of the BEEP Amplifier and fig. 4 shows the copper foil layout for the printed circuit board. Table 1 lists all the parts required for the project.

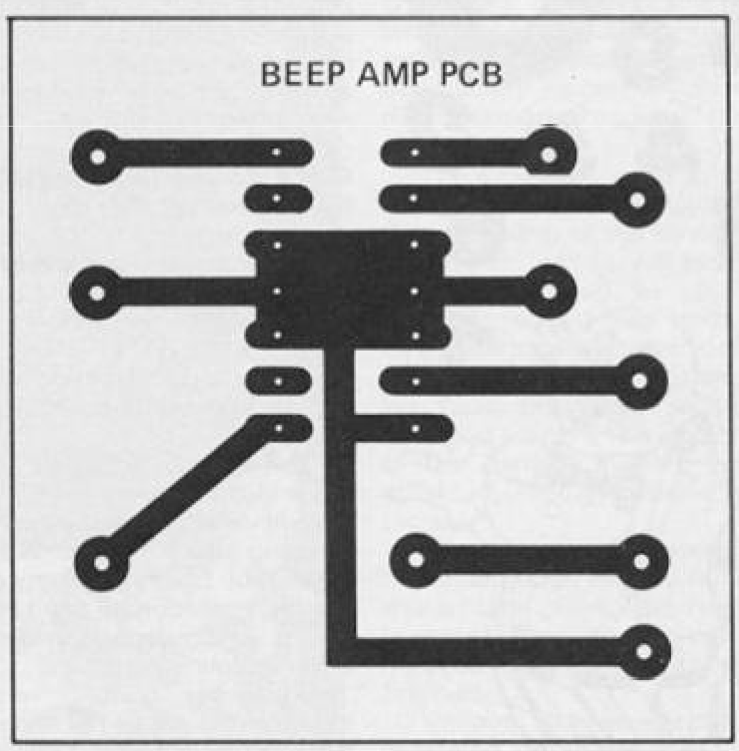
BUYLINES

All components used in this project, with the exception of the PCB, can be purchased from electronics suppliers who advertise regularly in electronics magazines. The PCB is available from Newtech (Micro) Developments Ltd. of 1, Courtlands Road, Newton Abbot, Devon, for £2.50 + 30p postage. Newtech can also supply a full kit of parts for £9.95 which includes a drilled case in which to mount the amplifier, PCB, loudspeaker, volume control and all components (including a knob for the volume control).

Table 1, Parts List.

IC1	LM380
C1	0.1uf Ceramic disc capacitor
C2	470uf Electrolytic capacitor 16V
VR1	22K LOG potentiometer
LS1	8R 2" Loudspeaker
SK1	3.5mm jack socket
SK2	2.1mm power socket
PL1	2.1mm power plug

Miscellaneous:
PCB, Case, 2 nuts and bolts for SK2, Knob, lightweight connecting wire, solder.



PCB COPPER FOIL PATTERN
2 : 1 SCALE

EFORM

A useful routine for the mathematical dabbler provided by David Roberts of London.



The following BASIC subroutine allows the user to PRINT any numeric variable or constant in E format as opposed to leaving it to the discretion of the ROM. Also, a variable number of significant figures is available and rounded up where necessary. The principal advantage of this utility is in knowing, a priori, how much space a number will take in the display.

The subroutine can be used without any acquaintance with the principles involved. The value to be PRINTed is placed in a reserved variable which has been called 'a'. For example, if we want to PRINT x, y, z(3) and so on we simply LET a = x, y, z(3) and so on. The number of significant figures required is defined by n, either permanently at the beginning of a program or as a temporary value just prior to calling the subroutine. The PRINT position is expected to have been set by the calling routine; the first position being a space for positive numbers and, would you believe, a minus sign for negative numbers. A GO SUB EFORM (EFORM, of course, being defined at an earlier stage) completes the operation.

The value of n may be an integer in the range 2 to 8 with a default value of 6 in the event of a typing error — I don't like the term idiot proofing because of the disproportionate use I make of the safeguards provided in other people's programs!

Rigourous tests have not been carried out on the speed of the subroutine since it will vary from program to program but the following test program PRINTed numbers about 10 times slower than the ROM. This may sound an eternity but scientific users should find it tolerable. EFORM can easily be converted to work on a ZX81 but it was found intolerable in SLOW mode. Users crunching numbers on a ZX81 will probably have the machine working in FAST mode anyway. The PRINTing of the exponent differs to the Sinclair representation. The following examples illustrate the differences.

Sinclair	EFORM
E+9	E+09
E−9	E−09

and with E 00 PRINTed for a zero exponent. This is purely cosmetic and can easily be altered if required.

Those who may be interested in how EFORM works would be best advised to work through some examples by hand. However, line 1040 requires a little explanation. After calculating the exponent b and mantissa c, provided that c is not an integer, from a PRINTing point of view the conversion of c into a string is not necessary remembering that the machine accuracy is greater than 9 significant figures decimal, but less than 10 and the PRINT accuracy is 8 rounded. The calculation of b may fail because of machine accuracy but this creates a complimentary situation in calculating c and so requires no additional work. Generally, we would need the services of INT and VAL but since, in theory, $1 \leqslant c < 10$ we can simplify the checking by using LEN. In practice c may take the values 1 and 10, and integers between, hence line 1040.

Inevitably, the number to be PRINTed is corrupted simply by examining it but this corruption is in the 9th significant figure. Rounding to 8 significant figures will then be suspect, if not already by virtue of whatever number crunching is involved prior to calling EFORM.

Readers who would prefer a faster routine may like to adapt a little routine in the ROM starting at address 2DE3 which Ian Logan calls PRINT_FP. I've allocated the next bank holiday weekend for this task (tongue firmly in cheek).

```
  10 LET EFORM=1000
  20 PRINT TAB 3;"X INPUT";TAB 1
5;"N";TAB 21;"E FORMAT"''
  30 INPUT "X= ";x,"N= ";n
  40 PRINT x;TAB 15;n;TAB 18;
  50 REM
  60 REM [NOTE: PRINT POSITION
  70 REM    HAS BEEN SET]
  80 REM
  90 REM [LET A = VARIABLE
 100 REM  TO BE PRINTED]
 110 REM
 120 LET a=x: GO SUB EFORM
 130 GO TO 30
 995 REM
 996 REM *****************
 997 REM *SUBROUTINE EFORM*
 998 REM *****************
 999 REM
1000 IF a=0 THEN PRINT " 0": RET
URN
1010 IF n<2 OR n>8 THEN LET n=6
1020 LET b=INT (LN ABS a/2.30258
509)
1030 LET c=INT (a*10↑(n-b-1)+.5)
/10↑(n-1)
1040 LET c$=STR$ c: LET l=LEN c$
-(a<0): IF l<=2 THEN LET c$=c$(
TO 1+(a<0))+".": LET b=b+(l=2):
LET l=l+(l=1)
1050 PRINT " " AND (a>0);c$;"000
0000"( TO n+1-l);"E";"+" AND (b>
0);" " AND (b=0);"-" AND (b<0);"
0" AND (ABS b<10);ABS b: RETURN
```

Mindplay

An extended section this month due to the mass of this type of program recently released! Greg Turnbull's brain was sorely tested!

Avalon
Hewson Consultants Ltd.
48K Spectrum
Price £17.95

Avalon is a superb new 3-D graphical adventure program for the Spectrum. The screen displays are incredible; it's amazing what can be achieved on a Spectrum when programmers exert themselves, and this game is easily on a par with many Atari programs.

The format is reminiscent of Atic Atac or Sabrewulf, but involves many adventure elements as well. The 3-D effect is one of the best around, however, it still isn't totally convincing. The sprite movement of characters around the screen is quite smooth; making it fun just to travel round the various rooms watching the action.

A joystick is a big help as moving through doors can be tricky for the inexperienced. There are numerous characters to meet and problems to be solved; however, overall the style is far more arcade-game than adventure.

Instead of a score option you have stages and ranks to ascend as your skill progresses. As you have assumed the role of Maroc the magician there are various spells to collect on your journey, e.g: "unseen", "energise", "missile", "flame" and "servant" (who can help you collect objects, etc.). Mapping is possile by pausing the game at suitable locations and SAVE/LOAD 'old' game is supported.

Your quest is to travel through the eight levels and finally to banish the Lords of Chaos from the Isle of Glass. There are numerous rooms to explore and objects to locate; but selecting and activating spells can be difficult, especially if you're being chased by enemies at the time. This makes the game hard to play at first, however, it's well worth persevering with it.

Presumably it will appeal most to those people whose manual skills allow them to beat 'Atic Atac' with ease, and who are looking for something more challenging. Hopefully this trend in advanced graphics and player interaction will continue in other similar programs. It certainly seems to point the way for the future trend in adventures. Overall a superb game whose merits cannot be too highly praised.



The Journey
Temptation Sofware Ltd.
48K Spectrum

This journey is a Middle-Earth type of adventure, with a somewhat unusual feature; you don't have to discover tricky words in order to explore it. However, there are some complicated problems to be overcome, involving devious use of the various recognised words.

This is one of the new style real-time, interactive adventures. The real-time being of paramount importance, as the characters do have a limited amount of individual choice of action. Also, certain events will periodically occur which you must take advantage of, if you are to succeed.

The objective is to explore the many lands and finally locate the white ship of the Elves. The interactive feature will need to be regularly used, as you will certainly require help from the other characters in order to complete your quest. To obtain this you must first gain their trust; how you achieve this is another of the game's puzzles which must be solved by trial and error tactics.

Limited use of graphics is made, although they do not add much to the game. There are only some 75 locations, but many must be explored before you are finished.

Various clues are carefully scattered throughout the locations, hidden by the use of the a symbolic language. Hence, the early stages consist of explora- ▶

tions to work-out this code. Once deciphered the clues will guide your actions during the adventure.

Always examine things thoroughly and use the help of others to defeat your enemies, if possible. If you must attack any of the guardians yourself, make sure you are strong enough and have a suitable weapon to hand. The use of 'real-time' will aid you in this task. How you act determines how the other characters react towards you, so think carefully.

The final solution to this adventure is quite devious and will involve much thought, as well as frequent saving of useful stages of play. As always, careful mapping of all locations is essential.

In conclusion a refreshing adventure because of the well-defined vocabularly. It's nice to know that if you're not getting anywhere, it's not solely due to the fact that you can't think of the right words to use. Hopefully this trend in adventuring will continue in the future, well worth the tape price.

Quest for the Holy Joystick
Delta 4 Software
48K Spectrum
Price: £4.95

This program is a supremely funny, text-only adventure written using the ubiquitous 'Quill'. It is based on every major Spectrum game you could imagine and many famous T" shows as well.

You start off in Downing Street, travel through London and visit various places around the world. There is apparently little actual objective to the adventure other than to enjoy yourself reading the superb text.

Here are a few examples to whet your appetite: the Pyeman (spot the deliberate spelling mistake), a little pink guy with a long nose who's into maths and old clocks. Miner Wally and his NCB boots, explore the Wet Jet Silly mansion where you can find hints on various POKE's to alter the game. Valhalla, where arrows point out text and grammar.

Proland Prat Simplestar who lives in the sewer under the Breakfast TV studios. Helbourne Mouse, where you can visit the Goblin's dungeon: here Bard says, "The butler did it!", Elrond fixes some lunch and something drops from above and misses.

Visit the umpteenth Microfair at cold, wind-swept Ally Pally, where a well-known reviewer (T.N.) will try to sell you one of his books. See VIC 20's which require several RAM-packs to hand a massive adventure comprising only, "go North!".

As you can see, there are numerous amusing locations and characters to meet, including: Soho, Baker St., Camelot castle, Dallas, Australia, meet Neil of 'The young ones', get chased by mutant BBC's saying "No such variable!" and many others.

Overall an incredible game, a must for all experienced adventurers looking for some lighter entertainment, or confirmed TV addicts. The only objective I could see appears to be the need to rid Camden Town of Proland Prat, so possibly you may not want to repeatedly play this adventure. Otherwise the contents really are superb, it certainly makes a pleasant change from the normal adventure.

Cribbage
Gamma Software
48K Spectrum

I approached this program with some trepidation, being interested in the traditional cardgame version already. Personally I couldn't see how this two-player game of moderate skill and tactics could be successfully transferred to the Spectrum.

No instruction manual was provided with the game; however, full on-screen instructions are supplied on loading the tape. These take you through the basic rules of the game: play, scoring, winning conditions, etc.

As I exected, you are only able to play against the computer itself, which handles all the dealing and scoring chores. Unfortunately here, this proves to be the main flaw in the game. Half the fun of the card version is in the dealing and calculating how many points you make, by yourself.

With this element removed each deal becomes extremely quick and, as no levels of play are involved, I could easily imagine becoming rapidly bored with the game. Possibly there is too much 'luck of the deal' involved and too little thought required, making it hardly a challenge at all. The only 'skill' is in the experience required to discard the right cards.

On the positive side, the graphical display of the board is excellent and the computer does give full details of how the points are being scored at each stage. A few hours with this tape would be a good way to learn how to play the game, so I suppose it can be recommended on that level.

A human player, however, remains a far more interesting opponent than the computer. At least as far as cribbage is concerned.

Thriller
Amazing Games
48K Spectrum
Price: £5.50

Thriller is a soon to be released adventure based on a gothic horror theme, centred around a journey through a sinister funhouse.

As for all Amazing Games tapes, this is a standard text-only program. However, the locations are well described and so become most interesting.

Much of the vocabulary is non-standard, so a careful examination of everything is recommended. The adventure soon proves to be very difficult, with even the first puzzle causing great problems. The text says, "The Funhouse — pay to get in, pray to get out". I was praying just to get in!

The manual gives little away, HELP is available but is highly cryptic as usual; you often get tired of seeing the repeated message: "I don't understand you". Unlike many adventures, almost all of the objects in the descriptions actually exist and have a purpose (i.e. are clues to help you).

The number of goes is related to 'pseudo-time', so if you don't get it right fairly soon you die. Ask for a SCORE and you get: "This isn't a game mortal fool!"; what is it supposed to be then? Once you do get started, you will encounter various movie-related monsters in the course of your travel.

Although I liked the idea behind this, I feel it must be said that it isn't an adventure for beginners. Experienced players will enjoy the extremely complex puzzles offered here, as a great deal of careful thought is required to get anywhere. A degree of lateral thinking (also known as having a good guess) will be most helpful too. An interesting adventure to watch out for.

Bismark
A.S.P. Software Group
16/48K Spectrum

Seek-out and destroy the infamous Bismark using your fleet of British ships, in this latest release from ASP.

You have already lost HMS Hoods **AND** contact with the enemy, due to the worsening weather conditions. You command a fleet of twelve ships and must locate the Bismark, and sink her, before time runs out.

The game is played on a 20 × 15 grid, surrounded by all the relevant information required in your quest for the German menace. You have 13 game turns to locate her before she escapes or you run out of fuel.

Naturally, tactics are all-important during play, as you attempt to set up an effective search pattern. However, you mustn't spread your forces too thinly, as more than one ship is required to attack and defeat the Bismark.

Movement in each turn is imited and is performed by force number/cursor keys. Any enemy sightings are reported and displayed on the screen. If requested, attacks will be handled automatically by the computer. the combat sound-effects are quite effective too.

The program is written in BASIC and is 'Battleships' based, so it is possible that it may not hold your attention on repeated playing. Anyway this game is a good version and offers some variation on a rather standard format.

Rebelstar Raiders
Red Shift
48K Spectrum
Price: £9.95

Yet another excellent strategy program from the Red Shift guys. This one takes the Apocalypse war-game idea to new heights. The theme is a two-player tactical combat game, with three different scenarios to try out.

The setting is the 25th century, where the good guys (Joe Capricorn and his rebels) must battle against the tyranny of the Main-Comp and the operatives.

Each player controls many individual characters. Those have varying weapons, armour, movement capabilities and unique names. The weapon carried by the character determines his usefulness during the game. varying weapons carried by the character determines his usefulness during the game.

A game may take many hours to play, but is great fun and you don't seem to notice the passing of time! Instructions for

the program come in the form of a fully comprehensive manual.

Play consists of a number of phases:

A) Deployment of troops:
This is critical to the overall strategy of the game and is where experience really counts. Some troops are already deployed and one scenario even allows for reinforcements.

B) Game turns:
These are limited which is in effect a time limit to be considered during play. Each turn consists of a number of different modes.

(i) Cursor mode which is used to gain information about a character or a weapon.

(ii) Movement mode which uses the non-standard Apocalypse system. This is limited by the points system and varies with terrain being crossed.

(iii) Combat mode which uses up movement points and sometimes the weapon too! Close-in fighting isn't too interesting. However, ranged combat is visually superb. You can hide being a wall and in one turn move out, attack an opponent and retreat again. The laser and graphical blast effects are well done.

The skill of the game comes in knowing which weapons to use and where to place (and move) specific characters.

Victory is achieved by another points system; you may have to wipe out all of your opponent's men, or complete the object of the scenario successfully.

Although the program is in BASIC it does have Machine Code sections and so is quite quick, and highly addictive too.

Weapons vary in the three scenarios available and each game is totally different from the last. This makes it very hard to get bored with the screens. Like Apocalypse, further expansion tapes are planned.

The only minor quibbles I can think of are the tendency to continue to fire for too long, and sometimes you can miss an opponent and kill one of your own men!

Otherwise a marvellous game that will get you thinking, but at the same time is highly enjoyable. A compulsory addition to any strategy fan's tape library.

Advance to Mayfair
Amazing Games
48K Spectrum
Price: £5.50

This is an extremely poor implementation of the much copied board game, where the only sort of board you get is in the loading picture!

Incredibly it involves just you against the computer, the only guidance being a series of menus. The property list goes through everything: what you own, your cash (and the same for the computer) and then all the unsold properties as well.

It is amazingly tedious to play, and in my opinion a total waste of money. Buy Automata's excellent version instead.

The Last Jedi
48K Spectrum
Price: £5.50

This is a 'Star Wars' based text-only adventure with an unusual text scrolling format. Sadly it reduces to exploring very similar-looking caves to find the usual sorts of objects and killing various enemies.

Eventually you get sick of killing endless stormtroopers with your lightsaber, and the game rapidly becomes boring. The out of tune 'Star Wars' theme at the start is quite amusing, but otherwise there is little to excite players of this program.

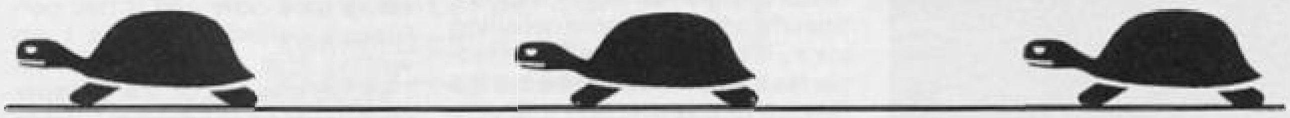
One nice feature is that you can actually will some opponents to sleep rather than kill them. Because there are so many rooms (over 500!) good mapping is essential.

Games like this have been almost totally superseded by the recent graphical adventures. Text-only programs now need to have beautifully written descriptions of their locations, this one hasn't.

Finally, I would love to hear from readers who are having problems; wish to recommend a game (or criticise); have any useful hints or who would just like to say hello!

Tortoise Wise

More lines from a parent who gets left behind, by David Stewart



Conscious of my parental duties, maybe even feeling a little guilty of neglecting the Opposition, I pop in to say Goodnight to the Hares. Or as my wife insists, our two sons.

"How's school?"

"O.K."

"Still being chased by the girls? Or is it the other way around?" The twelve year old snorts in what I take to be disgust. His younger brother sniggers in what I take to be innocence.

"I'm not interested in stupid girls," mutters the eldest. I laugh.

"Only joking don't worry. It'll hit you one day. Mind you, when I was your age . . . ."

"No, "the eldest hare continues seriously and philosophically, "I think there's more future in computers."

Has the cold monitor screen frozen the hearts of the hares I wonder to myself? Will this slow them down? No. More than likely it is just one more advantage they seem to have over me. One encumbrance in life they have escaped.

"What about all that 'chip off the old block' stuff? "I mutter out aloud.

"Chip?"

"Silicon chips?"

"Micro chips? Now you're talking . . . . What do you want to know dad?"

"Nothing. Go to sleep now. Goodnight." Bemused, I walk away, remembering furtive appointments behind the bicycle sheds.

"They're spending too long indoors with inanimate hardware," I announce to the wife. "Next Saturday we're all going out for the day. Get some fresh air, see places and meet people. Look at Life . . . ."

And so, letting the train take the strain, we go down to the coast. "Not a bad diversionary tactic either, "chuckles the Tortoise to himself, as the countryside rushes past the windows. No manual needed here, no keyboard to frustrate me, no program to confound me, no jargon to confuse me. Here's where I can catch up, Tortoise wise.

"Look at the sheep, this area is famous for its wool . . . look at the fruit trees . . . look at the estuary, do you know what kind of bird that is? Look at the sea and the ships out there . . . "

"Dad?"

"What is it? Ask me any quetion you like. Let's enjoy ourselves out and about."

"Is there a shop at the station where we stop? Only if not can we go to one first?"

"Shops? Shops? Let's get away from shops today. Anyway, what would you want to buy so urgently — NO don't tell me . . . ."

"Computer magazines" they chorus. "And what about computer shops? Are there any down here? Can we go and see? . . . ."

We travel back in silence. Their heads buried in magazines. In the end I face facts.

"So, is there anything worth reading in *ZX Computing,*" I ask. Their faces light up, I can't stop them. The race is still on and I'm still a long way behind. However, the scenery IS interesting.

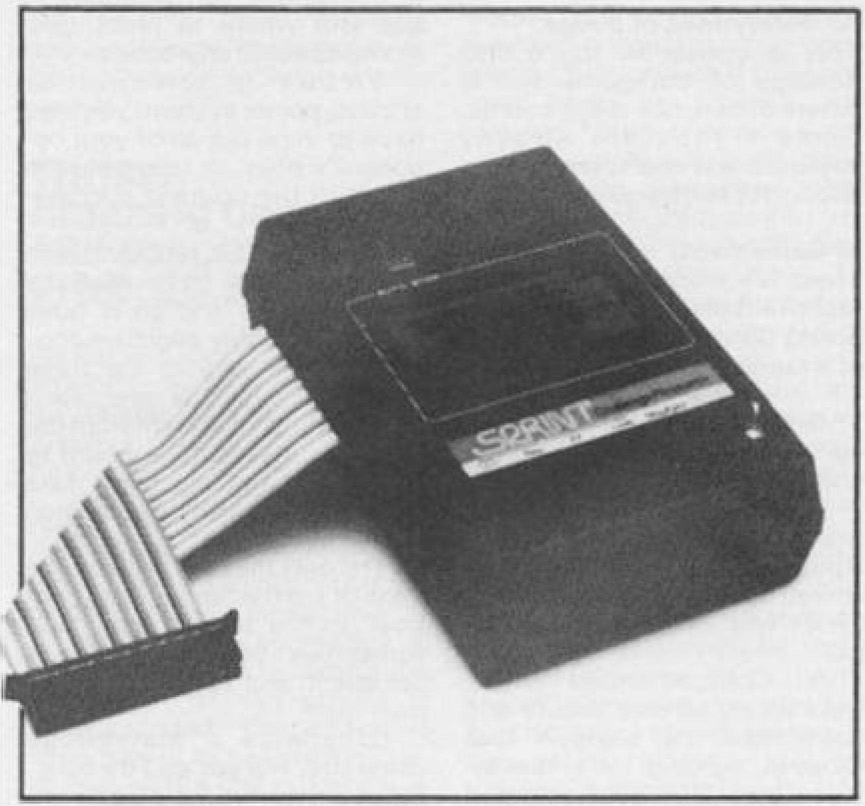
The Challenge Sprint

Many Spectrum users are still wary of the microdrive, and conflicting reports abound. There are those who find them invaluable and others who have nothing but trouble. If you are using your computer for a serious business purpose then investment in a disc system is probably the solution, but this is rather excessive for the average user who just wants reasonable loading and saving time for their programs and games.

An alternative is available in the Challenge Research Sprint tape recorder. This machine is a purpose built unit and only works with the Spectrum. Priced at £69.95 it is cheaper than the microdrive and Interface I combination but of course does not offer the RS232 or network facilities. The recorder is a neat black unit which is rather squat. It is connected directly to the computer via a ribbon cable to the user port at the rear of the computer. At the back of the recorder is a full extension port for the addition of other peripherals. A few units which I couldn't get to work with it were the VTX5000 modem and the Technology Research Disk interface. However a wide variety of joystick interfaces and other units, incuding the Interface I and Microdrives, functioned without any problem.

This is a clever unit which increases speed by running the tape at a higher rate than usual, roughly three times as fast. All normal program tapes will load in this way and any programs saved with this recorder will reload from an ordinary recorder. Programs which will not load are those saved with special high speed software systems, such as those used by Micromega and the latest Mikrogen software.

In use this proved to work as claimed, it was reliable and really did improve the SAVE/LOAD time. My son, who helped to test it, actually took off his microdrive and used it in preference and was quite sad when we returned it! A unit which I would recommend to the general user, and sum up the



advantages as improved speed, compatibility with other cassette players and fairly low cost. The disadvantages are that it is not totally compatible with all peripherals, and unsuitable for loading some (rather good) games.

AMS Lo-Profile Keyboard



The Lo-Profile Keyboard from Advanced Memory systems is a fairly large unit which is, as the name implies, quite slimline. However, its length and width are excessively proportioned but, having said that I must add that the overall look is rather elegant.

Using a unique system the keys are sprung by a rubber bubble, this makes them the most sensitive to press that I have ever encountered, but at the same time they have a very positive feel and spring back quickly. A touch typist could outpace the Spectrum's input speed. The key tops themselves feature engraved legends rather than the cheaper, more common sticky labels and have a nice tactile feel. A full sized space bar is a feature of this unit and it is very well balanced. A numeric keypad is also included and this is situated to the right of the main keys.

An extra Caps Lock is added to the left above the Caps Shift key, though both keys still need to be pressed at the same time. On the numeric pad, an extra "." key is included but again this still needs to be pressed at the same time as the Symbol Shift key. Both sets of keys are slightly stepped and have an unusual but effective concave curve to them. The base, unseen in use, is shiny plastic but the top has a classy matt finish to it.

Fitting the Spectrum is very easy and all that is required is that you unscrew the two keyboard halves, unscrew the two spectrum case halves and remove the top, carefully pulling out the keyboard ribbon cables. Finally, undo the single screw holding the PCB in place and transfer it to the base of the AMS where it is held by the four screws supplied, push in the AMS keyboard ribbons and screw the two halves of the case back together.

I have used this keyboard for some time now and it has performed perfectly, in fact I am writing this review on it! At £49.95 it is one of the cheaper keyboards on the market, and as such it lacks some of the features of the more expensive ones, such as single key E mode, dot and comma. But, in contrast it has a superb set of keytops with the engraved legends. If you are planning to upgrade from the Standard Spectrum keyboard and, unless you really feel that you need the missing features, then I suggest that you give this keyboard due consideration. This reviewer is impressed!

AMS can be contacted at, Green Lane, Appleton, Warrington, WA4 5N.

(We would just like to add that the price of the keyboard is £49.95, and not £19.95 as we stated in a previous issue — Ed)

PATIENCE V — PAIRS

CN Gooch presents the fifth in his mind stretching series on the popular card pastimes of Somerset.

This is a Patience game in which you are required to collect pairs of cards of the same value, irrespective of suit, from a grid of five by three cards. To take a pair they must be touching, vertically, horizontally or diagonally. Each card on the screen is referenced by a letter and you input those letters to make a move. Full rules are given in the program.

In this presentation IO have not attempted to simulate a normal playing card. The display size restricts the card dimensions too much for a good representation. In any case as the suits in this game are not used I have opted for a large numerical display of each card.

Program operation

The pack of cards to use is held in a string P$ and cards are transferred to the hand in play on the screen, represented by H$. When you input a move the program checks to see that this is a valid move, removes the two cards from H$, adds two new cards from P$, clears the display and reprints the new hand. Illegal moves will not be allowed.

Line to line

1020	Defines functions which work out the positions of card.
1030	Sets CAPS SHIFT
1040	Calls initialisation Instruction and pack set up subroutines
1050 1060	Sets up initial hand and screen display
1070 1080	Control loop
1100 1130	Prints out the reference letters and the hand of cards. The card printing loop runs from Z1 which is the position of the first deleted card. PSL is a slicing variable which keeps track of the card in the pack.
1140 1180	Prints out a card. The value of the card is added to 9100 to give a restore data value. This gives five values which print out the card from N$.
1200 1370	This subroutine accepts your input and checks that it is legal. Line 1240 ensures that whatever card is entered first, the order is earliest card first. The check can then be made that the cards are either 6,5,4, or 1 places apart.
1380 1470	Sets up the pack and shuffles it. Each card is five elements long Name;value (2):suit and colour.
1480	Continuity
1480 1570	End game routine
1580 1680	Instructions
1690 2040	Sets up N$(x) which contains all of the graphics to set up the cards.
2200 2220	Sets up graphics
2230 2400	Data for graphics
9101 9113	Data to print cards. It is essential that these line numbers are used as the program calls them directly.
9990 9993	Save routine. Program must be saved to auto start at 2200 or graphics will not form.

Variables used

A	counting variable
COL	colour of card
DIF	relative position of cards to be moved
M,N,P,Q	loops
PSL	pack slicer
RES	flag set to indicate game end resignation
X,Y	location of card
Z(x)	card reference value. Derived from z$
A$	assembling pack
B$	suit
C$	card in play
D$	temporary string
H$	hand in play
P$	shuffled pack
z$	input

Memory

Although the program is not exceptionally long it uses quite a lot of RAM as it shuffles the strings around and will not run on the 16K machine.

```
   1 REM ************************
         *Underlined characters*
         *are entered in       *
         *GRAPHICS mode.       *
         ************************

1Ø2Ø DEF FN C(X)=1+6*(X=2 OR X=7
 OR X=12)+12*(X=3 OR X=8 OR X=13
)+18*(X=4 OR X=9 OR X=14)+24*(X=
5 OR X=1Ø OR X=15): DEF FN D(X)=
7*(X>5 AND X<11)+14*(X>1Ø)
1Ø3Ø CLS : RANDOMIZE : POKE 2365
8,8
1Ø4Ø GO SUB 169Ø: GO SUB 158Ø: G
O SUB 138Ø
1Ø5Ø BORDER 4: PAPER 4: CLS
1Ø6Ø FOR M=1 TO 15: PRINT AT FN
D(M)+4,FN C(M)-1; PAPER 6;CHR$ (
M+64): NEXT M: GO SUB 1Ø9Ø
1Ø7Ø GO SUB 119Ø: IF RES OR LEN
H$=Ø THEN  GO TO 149Ø
1Ø8Ø GO SUB 111Ø: GO TO 1Ø7Ø
1Ø9Ø REM PRINT  HAND
11ØØ LET H$=P$(1 TO 75): LET P$=
P$(76 TO ): LET Z(1)=1: LET PSL=
1: GO TO 112Ø
111Ø FOR M=Z(1) TO 15: LET X=FN
C(M): LET Y=FN D(M): FOR N=Ø TO
5: PRINT AT Y+N,X; PAPER 4;"
": NEXT N: NEXT M
112Ø FOR M=Z(1) TO LEN H$/5: LET
 C$=H$(PSL TO PSL+4): LET X=FN C
(M): LET Y=FN D(M): GO SUB 114Ø:
 LET PSL=PSL+5: NEXT M : PRINT A
T 21,6; INK 1; PAPER 5;"
            ";AT 21,6;"  CARDS LEF
T ";LEN P$/5
113Ø RETURN
114Ø REM PRINT CARD
115Ø PAPER 7: INK VAL C$(5): FOR
 N=Ø TO 4: PRINT AT Y+N,X; PAPER
 7;"     ": NEXT N: PRINT AT Y,X;
C$(1);C$(4);C$(4);C$(1)
116Ø RESTORE 91ØØ+VAL C$(2 TO 3)
: FOR N=1 TO 4: READ A: PRINT AT
 Y+N,X;N$(A): NEXT N
117Ø PRINT AT Y+5,X; PAPER 4; IN
K 7;"▀▀▀▀▀▀"
```

```
1180 RETURN
1190 REM CHOOSE CARDS
1200 INPUT AT Ø,Ø; INK Ø;"WHICH
PAIR TO MOVE? ENTER TWO";AT 1,Ø;
"LETTERS eg.AE(ØØ TO RESIGN) ";
LINE Z$: IF Z$="ØØ" THEN  LET RE
S=1: RETURN
121Ø IF LEN Z$<>2 THEN  GO TO 13
7Ø
122Ø FOR N=1 TO 2: IF Z$(N)="" O
R CODE Z$(N)<65 OR CODE Z$(N)>79
 THEN  GO TO 137Ø
123Ø LET Z(N)=CODE Z$(N)-64: NEX
T N
124Ø IF Z(1)>Z(2) THEN  LET Z(3)
=Z(1): LET Z(1)=Z(2): LET Z(2)=Z
(3)
125Ø IF H$(Z(1)*5-4)<>H$(Z(2)*5-
4) THEN  GO TO 137Ø
126Ø LET DIF=Z(2)-Z(1): IF DIF<>
6 AND DIF<>5 AND DIF<>4 AND DIF<
>1 THEN  GO TO 137Ø
127Ø IF Z(1)=1 AND LEN H$=1Ø THE
N  LET H$=""
128Ø IF Z(1)=1 AND Z(2)<LEN H$/5
 THEN  LET H$=H$(6 TO Z(2)*5-5)+
H$(Z(2)*5+1 TO ): GO TO 133Ø
129Ø IF Z(1)=1 AND Z(2)=LEN H$/5
 THEN  LET H$=H$(6 TO Z(2)*5-5):
 GO TO 133Ø
13ØØ IF Z(1)>1 AND Z(2)<LEN H$/5
 THEN  LET H$=H$( TO Z(1)*5-5)+H
$(Z(1)*5+1 TO Z(2)*5-5)+H$(Z(2)*
5+1 TO ): GO TO 133Ø
131Ø IF Z(1)>1 AND Z(2)=LEN H$/5
 THEN  LET H$=H$( TO Z(1)*5-5)+H
$(Z(1)*5+1 TO Z(2)*5-5)
133Ø LET PSL=1+5*Z(1)*(Z(1)>1)-5
*(Z(1)>1)
134Ø IF P$="" THEN  RETURN
135Ø IF LEN P$>=1Ø THEN  LET H$=
H$+P$(1 TO 1Ø): LET P$=P$(11 TO
): RETURN
136Ø LET H$=H$+P$: LET P$="": RE
TURN
137Ø PRINT #1;AT Ø,Ø;"INPUT UNNA
CCEPTABLE": BEEP .5,2Ø: PAUSE 1Ø
Ø: GO TO 12ØØ
138Ø REM SET UP PACK
139Ø LET A$="": LET D$="AØ12Ø23Ø
34Ø45Ø56Ø67Ø78Ø89Ø9A1ØJ11Q12K13"
14ØØ PRINT AT 8,9; INK 1; PAPER
5;B$;B$;B$;B$;AT 1Ø,1Ø; FLASH 1;
 PAPER 7; INK 2;"PREPARING PACK"
;AT 12,9; FLASH Ø; PAPER 5; INK
1;B$;B$;B$;B$
141Ø FOR Q=1 TO 39 STEP 3: FOR P
=1 TO 4: LET COL=Ø: IF P=1 OR P=
3 THEN  LET COL=2
142Ø LET A$=A$+D$(Q TO Q+2)+B$(P
)+STR$ COL
143Ø NEXT P: NEXT Q
144Ø CLS : PRINT AT 8,9; PAPER 5
; INK 1;B$;B$;B$;B$;AT 1Ø,12; PA
PER 7; FLASH 1;"SHUFFLING";AT 12
,7; PAPER 5; INK 1; FLASH Ø;B$;B
$;B$;B$
145Ø FOR N=1 TO 6Ø: LET A=1+(5*(
1+INT (RND*5Ø))): IF n/2=INT (n/
2) THEN  LET A$=A$(A TO A+4)+A$(
 TO A-1)+A$(A+5 TO ): BEEP .Ø1,N
-1Ø
146Ø IF n/2<>INT (n/2) THEN  LET
 A$=A$( TO A-1)+A$(A+5 TO )+A$(A
 TO A+4): BEEP .Ø1,N+5
147Ø NEXT N: LET P$=A$: CLS : RE
TURN
148Ø INPUT "PRESS ENTER TO CONTI
NUE"; LINE Z$: BEEP .Ø5,1Ø: RETU
RN
149Ø REM END GAME
15ØØ PAPER 5: INK 1: FOR N=12 TO
 21: PRINT AT N,Ø; PAPER 5;"
                              ": N
EXT N
151Ø IF RES THEN  PRINT AT 13,1;
"BAD LUCK: THE CARDS DID NOT ";A
T 14,1;"RUN YOUR WAY"
152Ø IF NOT RES THEN  PRINT AT 1
3,1; FLASH 1;"!!!!! WELL DONE !!
!!!!";AT 14,1; FLASH Ø;"YOUR PAT
IENCE IS REWARDED"
153Ø PRINT AT 16,3;"YOU MAY";AT
17,5;"1)PLAY AGAIN";AT 18,5;"2)F
INISH PLAYING"
154Ø PAUSE Ø
155Ø IF INKEY$="1" THEN  BORDER
4: PAPER 4: INK Ø: CLS : LET RES
=Ø: GO SUB 144Ø: GO TO 1Ø5Ø
156Ø IF INKEY$="2" THEN  CLS : P
RINT AT 1Ø,Ø;"START TAPE TO LOAD
 NEXT GAME": LOAD ""
157Ø GO TO 153Ø
158Ø REM INSTRUCTIONS
159Ø LET T$=" PATIENCE PAIRS ":
PAPER 6: CLS : FOR M=Ø TO 16 STE
P 16: FOR N=Ø TO 21:: PRINT  PAP
ER 1+INT (RND*7); BRIGHT 1; INK
9;AT N,M;T$: BEEP .Ø5,ATTR (N,M)
/1Ø: NEXT N: NEXT M
16ØØ FOR N=8 TO 13: PRINT AT N,5
; PAPER 1;"
 ": NEXT N
161Ø PRINT AT 9,7; INK 7; PAPER
1;"FOR RULES PRESS ""1""";AT 12,
7;"OTHERWISE ANY KEY"
162Ø PAUSE Ø: IF INKEY$<>"1" THE
N : CLS : RETURN
```

```
1630 FOR N=2 TO 19: PRINT AT N,1
; PAPER 6; INK 0;"
              ": NEXT N
1640 IF INKEY$<>"" THEN  GO TO 1
640
1650 PRINT AT 3,3; INK 0; PAPER
6;"A HAND OF 15 CARDS WILL BE";A
T 4,3;"DEALT OUT.": PAUSE 75: PR
INT AT 5,3; INK 0; PAPER 6;"YOU
MAY REMOVE ANY PAIR OF";AT 6,3;"
CARDS OF THE SAME VALUE,"
1660 PRINT AT 7,3; PAPER 6; INK
0;"AND THAT TOUCH VERTICALLY,";A
T 8,3;"DIAGONALLY OR HORIZONTALL
Y.": PAUSE 75: PRINT AT 10,3; PA
PER 6; INK 0;"ANY ILLEGAL MOVE I
S REJECTED"
1670 PAUSE 100: BEEP .1,30: PRIN
T AT 14,4; PAPER 2; INK 7;"PRESS
 ANY KEY TO CONTINUE";AT 17,10;
FLASH 1;"GOOD LUCK!!!!"
1680 PAUSE 0: CLS : RETURN
1690 DIM N$(32,4): DIM Z(3)
1700 LET N$(1)=" ▛▀▜"
1710 LET N$(2)="  GE"
1720 LET N$(3)=" GH"
1730 LET N$(4)=" I▄▄"
1740 LET N$(5)="  ▄J"
1750 LET N$(6)="   ▌"
1760 LET N$(7)=" ▙▄▟"
1770 LET N$(8)=" ▌"
1780 LET N$(9)=" ▌ ▖"
1790 LET N$(10)=" ▀▜▀"
1800 LET N$(11)=" ▛▀▀"
1810 LET N$(12)=" ▙▄▄"
1820 LET N$(13)=" ▛▀"
1830 LET N$(14)=" ▙▄▄"
1840 LET N$(15)=" ▌ ▌"
1850 LET N$(16)=" ▀▀▜"
1860 LET N$(17)=" ▀▀▜"
1870 LET N$(18)=" L▄J"
1880 LET N$(19)="  ▄▟"
1890 LET N$(20)="▌ GE"
1900 LET N$(21)="▌GH"
1910 LET N$(22)="▌QO"
1920 LET N$(23)="▌ PB"
1930 LET N$(24)=" ▌M▌"
1940 LET N$(25)=" ▀N▀"
1950 LET N$(26)="  ▀▜▀"
1960 LET N$(27)="   ▌"
1970 LET N$(28)=" ▙▟"
1980 LET N$(29)="▌▛▀▜"
1990 LET N$(30)="▌▌ ▌"
2000 LET N$(31)="▌▙▄▟"
2010 LET N$(32)=" K"
2020 LET B$="BCDE"
2030 LET RES=0
2040 RETURN
2190 REM INIT
2200 BORDER 2: CLS : PRINT AT 10
,2;"STOP THE TAPE PLEASE"
2210 RESTORE 2230: FOR N=0 TO 17
: FOR M=0 TO 7: BORDER M: BEEP .
01,N
2220 READ A: POKE USR CHR$ (97+N
)+M,A: NEXT M: NEXT N: GO TO 103
0
2230 DATA 0,94,82,82,82,82,94,0
2240 DATA 0,16,56,124,254,124,56
,16
2250 DATA 16,56,124,124,254,214,
84,16
2260 DATA 0,108,254,254,124,124,
56,16
2270 DATA 0,56,56,16,214,254,214
,16
2280 DATA 240,240,240,240,224,19
2,128,0
2290 DATA 1,3,7,15,31,63,127,255
2300 DATA 254,252,248,240,224,19
2,128,0
2310 DATA 254,252,248,240,255,25
5,255,255
2320 DATA 240,240,240,240,224,19
2,192,224
2330 DATA 254,252,248,240,240,24
0,240,240
2340 DATA 240,240,240,240,127,63
,63,127
2350 DATA 0,0,0,0,0,96,48,48
2360 DATA 255,255,255,255,24,12,
6,0
2370 DATA 128,192,224,240,248,25
2,254,255
2380 DATA 255,127,63,31,15,7,3,1
2390 DATA 255,255,255,255,255,23
1,195,129
2400 DATA 128,192,224,240,240,24
0,240,240
9101 DATA 1,15,1,15
9102 DATA 1,2,3,4
9103 DATA 1,5,6,7
9104 DATA 8,8,9,10
9105 DATA 11,12,6,7
9106 DATA 13,14,15,7
9107 DATA 16,2,3,32
9108 DATA 1,18,15,7
9109 DATA 1,15,17,19
9110 DATA 29,30,30,31
9111 DATA 26,27,27,28
9112 DATA 1,15,24,25
9113 DATA 20,21,22,23
9990 SAVE "patienceC" LINE 2200
9992 CLS : PRINT "SWITCH PLUGS A
ND REWIND TO "'"VERIFY.   START
TAPE"
9993 VERIFY "patienceC": CLS : P
RINT "ALL OK"
```

Club corner



Cape Town club

Dear ZX Computing,
I've decided to form a computer club with the help of a friend of mine. The club will cater for anyone with a ZX Spectrum. Unfortunately, we can cater for only 10 people. It will cost £4.50/R6,50 a year to join. Members will receive six issues of our magazine a month. For more information you could contact me at the following address.

Yours sincerely,
Alan Bradley
10 Leander Place
Kirstenhof 7945
Cape Town
S. Africa

ZX Correspondence Club

Dear ZX Computing,
First of all, I think your magazine is the best computing magazine there is. Secondly, I would like to tell anybody interested, that I have founded a ZX Correspondence Club.

Anybody wishing to join should write to me at the following address:

Yit-shun Leung-ki
9 ch Pasteur,
1209 Pt Saconnex,
Geneva, Switzerland

Hello Hatfield

Dear Sir,
I am interested in finding out if anyone in the Hatfield area is interested in starting a Computer Club. If anyone is interested in starting one with me, then please would they contact me at the following address. Thank you.

Yours sincerely,
Miss K.D. Yarwood
53 Meadow Croft
Hatfield
Herts AL10 0SG

Singapore Computing Club

Dear ZX Computing,
Thank you for your very informative and wonderful magazine.

I'm writing to you because I am setting up a ZX Computing Club over here, due to the vast number of Spectrum users — about 2000. Also, through your magazine users from other parts of the world can write to me to exchange ideas, software, and programming tips. I have at present, a software collection of over 3000 items. Membership is free, and members will receive our twice monthly newsletter.

Through the publishing of this letter, I hope users from Singapore can link-up with other users all over the world.
Thank you.

Yours truly,
Tay Chai Khoon (A.M.R.S.H.)
Blk 107, #09-667
Depot Rd.
Postal Code 0410
Republic of Singapore



Hawkes Bay Users' Group

Dear ZX Computing,
Here on the other side of the Earth, about as far from you as it is possible to get without assistance from NASA, is a group known as the Hawkes Bay Sinclair Users' Group.

We are 95 strong and growing, with an age range from 12 to 65+, who meet at nights approximately every 2/3 weeks, for about three hours.

The club was set up 18 months ago, when I bought a ZX81, and found I had a machine that was smarter than me, so to try to control it I got the names of other purchasers from all local retailers, and after contacting them for their views, set up a meeting and, lo, we had a group.

As we are so far from the home of Sinclair, magazines such as ZX Computing, help to keep us informed as to what is the latest state of the art. Especially good are the reviews of new programs, as to send away for a program on just the maker's advertising blurb is a good way of sometimes being ripped off.

Keep up the good work.

Yours sincerely,
Brian Thrussell
918 Florence St.
Hastings
New Zealand
'phone 85688

Spectrum Users, Australia

Dear Sir,
We are currently the largest ZX Spectrum users' group in Australia, with a very large following nationally. The club charges an annual membership fee of A$15 per year which entitles the member to a club membership card, giving him/her discounts at stores, a monthly newsletter of around 20 pages (example enclosed), free advice and special offers. The club is basically run by three people: Craig Kennedy (President), Chris Smith (Treasurer), and Greg Nancarrow (M/C Expert and problem solver), who handle all publishing and writing for the magazines, as well as catering for the members requests.

As well as running the club, we three can make claim to many other conquests concerning the solving of certain games which many of you English have been claiming rights to, as far as solving them first goes. This annoys us greatly!

To start with, The Hobbit. We rightfully claim to be the first in the world to solve it (early 1983). You of course do not realise that we receive all English magazines at least three months after their publishing date, which means that anything we do in competition with the English and beat them at is already out of date by the time we hear about it. So far as competitions go, we are already out of the running just because we live in the best country in the world (down under in Australia does not mean down under in the computing world!!).

With Atic Atac, we solved it four months before we heard from England that it had been solved.

Concerning Jet Set Willy, it may have only just been realised by the author that there were bad mistakes in his program, but we realised it soon after we received it (early 1984) and removed them. We solved it not long after this, way before anyone else. So much for getting the prize.

We solved Sabre Wulf on the 15th of August 1984. We are quite sure this is way before anyone else, and can't wait for the sequel, 'Underwurlde'. Incidentally, we discovered the POKE for infinite lives, which happens to be POKE 43575, 255.

Finally, we have beaten Match Point in the finals.

So, don't forget we are down here keeping an eye on you.

Bewdy mate,
Craig Kennedy/Chris Smith
ZX Spectrum Users Group
P.O. Box 466
Epping 2121, N.S.W.
Australia

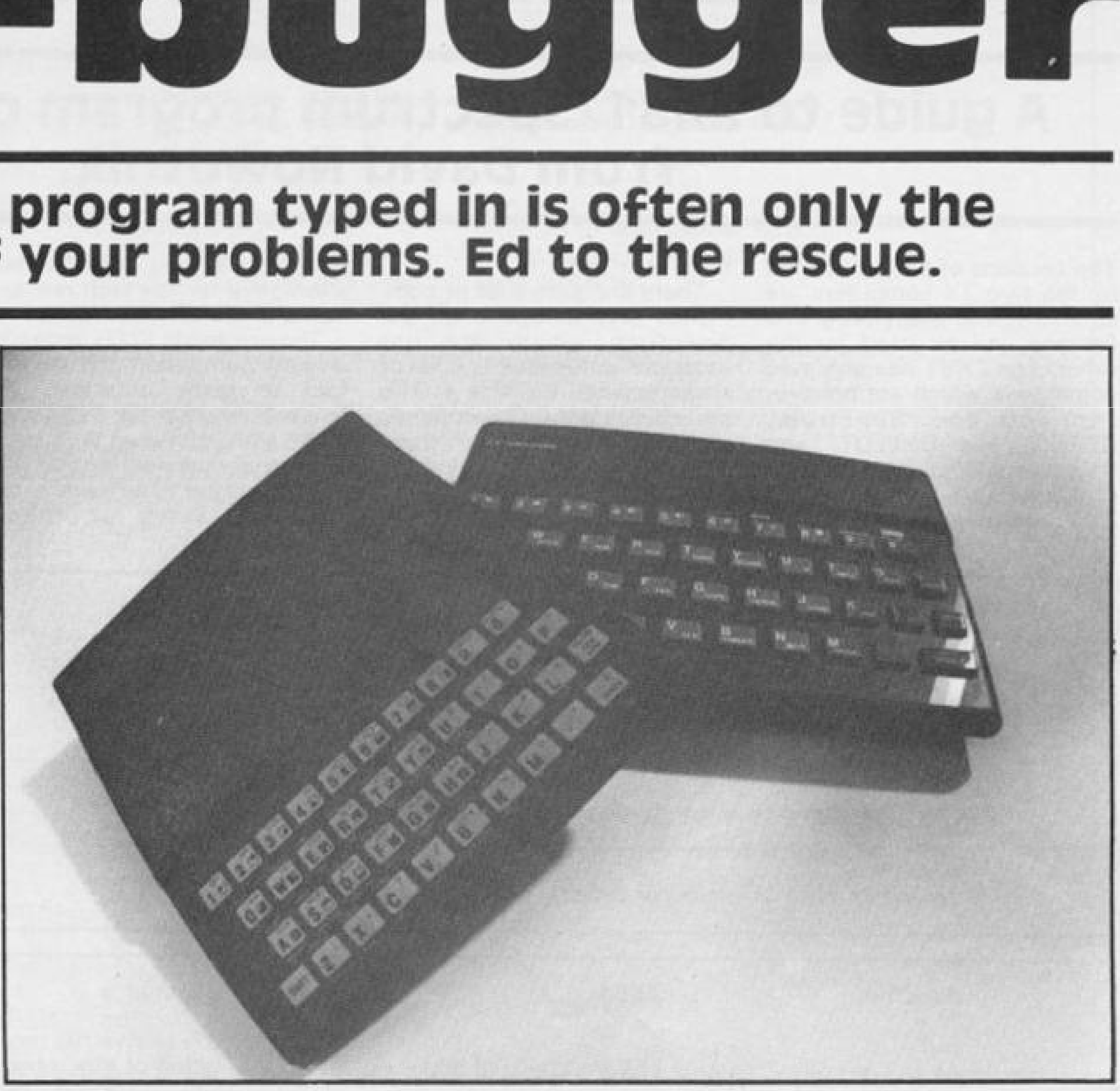
Thanks for the magazine, which is pretty good, and Bewdy to you too — Ed.

De-bugger

Getting a program typed in is often only the start of your problems. Ed to the rescue.

Typing in a program is a useful exercise. Apart from the patience required, techniques learned and the end program to be used, probably the most educational part of it is tracking down the bugs introduced by yourself or occasionally by our publication system.

In debugging you gain a much deeper insight and understanding on how the program actually works than by merely typing it in, but tracking down these errors is an art in itself and needs some skill. So here are some tips to help you in your efforts when faced with that cryptic error report!



1 NEXT without FOR
Look back through the program, either the loop has not been set up — no related FOR 'letter' = No1 TO No2 line, or the letter has been re-used as an ordinary variable within the loop with a LET 'letter' = No.

2 Variable not found
This is one of the most common errors. Again, the problem may not lie in the line where the error was detected and reported. If there is only one variable, which may be one or more letters or a string ($) variable, then that is the problem. There may be more than one variable in the line section reported and you will have to identify the offending one. In a line PRINT AT Y,X;A$ the culprit could be Y or X or A$. To find out which of them is causing the problem (it may be more than one) type in turn as a direct command:

PRINT Y Enter/Newline
PRINT X Enter/Newline
PRINT A$ Enter/Newline

Note which produces the error report. Now look back through the program printout for the line which sets it up — usually a LET or FOR command. Did you leave it out? Does the program get there or has a GOTO/GOSUB been wrongly addressed?

3 Subscript wrong
Connected with DIM A(No) or DIM A$(No). If the number in the brackets on the line where the error is reported is greater than the one in the original DIM statement, is not an integer or is less than 1, then this report is generated. If the subscript — number in brackets — is a number then check and change, however, if it is a variable then follow the procedure for tracing variables. It has probably exceeded the limits, look for lines with the variable being altered with + − ✱ / : if necessary add limiting code. For example:

IF X >10 THEN LET X = 10

4 Out of memory
As well as for programs which are too big, it may happen if the previous program set RAMtop. Before despairing, enter CLEAR USR "a"-1 on the Spectrum: on the ZX81 SAVE the program, turn the machine off and on, then reload the program.

7 RETURN without GOSUB
Somehow the computer has reached a RETURN command other than via a GOSUB instruction. Check a GOTO hasn't been entered in place of a GOSUB. Check for a missing GOSUB.

B Integer out of range
An integer (whole number) either as a number of variable is too big or small and you are attempting to do something like PRINT AT 0,33 — not allowed! Check any variables involved as per report 2 and trace it back through the program looking for adjustments to it by + − ✱ / : Add limiting code if needed — see report 3

E Out of DATA
A Spectrum problem. Check the number of DATA items match the number of READs; usually one (or more) has been missed out. Attempting to reread a DATA list without first using a RESTORE command will cause this and it can happen on an auto start program (saved with a LINE number). Good programming usually RESTOREs to the correct line number before using READ.

I FOR without NEXT
See report 1 but this time the NEXT is missing!

Note that the letters I have used for examples could by ANY letters not just A$,X,Y etc and depend on the particular choice of the programmer.

This is by no means a comprehensive list but I have tried to cover many of the most common error reports. Personally, I get almost as much satisfaction from debugging as I do from programming I do assure you, however, that there is absolutely no truth in the rumour that we deliberately inject bugs into our listings in order to introduce you to the dubious delights of debugging!

Conversion tips

A guide to ZX81/Spectrum program conversions from David Nowotnik.

The versions of BASIC offered by the two ZX computers are so similar that many programs for one can be used by the other. The ZX81 has only two commands which are not present on the Spectrum, SCROLL and UNPLOT, and these should cause you few problems when converting ZX81 programs to the Spectrum (see Table 1).

There are quite a lot of commands and functions on the Spectrum which are not available on the ZX81. A list of these appears in Table 4. The stars indicate those commands and functions for which there is no simple translation to ZX81 BASIC. Those for colour and sound can be ommitted; but you will have to find some alternative for the high resolution and file I/O commands.

The command PLOT appears on both computers, but the effect is quite different, so beware! Another tip: PEEK and POKE should be used with caution. In conversion, addresses will almost certainly have to be changed. Some of those changes appear in the tables. A command such as POKE USR "a" . . . . on the Spectrum indicates User Defined Graphics; ZX81 users don't have this facility, so you'll have to omit this and use a standard character instead.

ZX81	Spectrum	Comments
SCROLL	RANDOMISE USR 3582 or LET t=USR 3582	If the program uses random numbers, they could become rather predictable with the first option. If so, use the second, using a variable (in this case t) which is otherwise not used.
PLOT Y,X	PRINT AT 21−Y/2,X/2;	Print the appropriate quarter square graphics character.
UNPLOT Y,X	PRINT AT 21−Y/2,X/2;	Print a space, or the appropriate quarter square graphics character.

Table 1 ZX81 to Spectrum conversions.

Spectrum	ZX81	Comments
BIN eg LET y=BIN 10010101	LET y=(decimal no.) Conversion to decimal: 10010101=149 128 64 32 16 8 4 2 1 Add these numbers together when a 1 appears at the appropriate position in binary.	BIN allows the representation of a number in binary. On the ZX81 use the decimal equivalent, but beware; BIN is often used with User Defined Graphics, which are not available on the ZX81.
READ/DATA eg READ x,y DATA 50,60	LET LET X=50 LET Y=60	READ and DATA are used to store a lot of information in a program. Use LET instead.
DEF FN and FN eg DEF a(x)=SQR x LET t=FN a(i)	LET X$="SQR X" LET X=I LET T= VAL X$	The defined function can appear in a string. Use the keyword for built-in functions (eg SQR). The equivalent of FN may need 2 lines, as shown.
PLOT	no equivalent	
SCREEN$ eg LET a=SCREEN$ x,y	LET A=PEEK(PEEK 16396 +256*PEEK 16397+1+Y+33*X)	Used in interactive games to detect characters in the display file. Note — this formula only works when a RAM pack is fitted.

Table 2 Spectrum to ZX81 conversions.

ZX81	Spectrum	Comments
1 FRAMES POKE 16436,255 POKE 16437,255 LET T=(65535-PEEK 16436-256*PEEK 16437) /50	POKE 23672,0:POKE 23673,0 LET t=(PEEK 23672+256* PEEK 23673)/50 For times greater than 10 minutes, you can use byte 23674 as well.	Both computers have a counter which accurately varies by 50 every second. In the example, use the first line to start the 'clock'. The variable T will have the time in seconds after the start. The counter can only be used for 10 minutes.
2 Line number zero POKE 16510,0	POKE 23756,0 (As the start of BASIC can move, eg with microdrives) use with caution.	Converts the first line of a program to line number zero, which cannot be edited, and so is protected.
3 RAMTOP POKE 16388,X-256*INT (X/256) POKE 16389, INT (X/256)	CLEAR x	Creates a safe area at the top of RAM starting at address x, for storing data, machine code etc.

Table 3 General interconversion hints.



BEEP	*	FORMAT	*	ATTR	*
BORDER	*	INK	*	BIN	
BRIGHT	*	INVERSE		FN	
CAT	*	MERGE	*	IN	*
CIRCLE	*	MOVE	*	OVER	*
CLOSE	*	OPEN	*	POINT	*
DATA		OUT	*	SCREEN$	
DEF FN		PAPER	*	VAL$	*
DRAW	*	READ			
ERASE	*	RESTORE	*		
FLASH	*	VERIFY	*		

Table 4 Spectrum functions not available on the ZX81.

System Variables Conversion Table.

Variable	ZX81/ T/S1000	Spectrum/ TS2068
BREG	16414	23655
CDFLAG	16443	No Equivalent
CH ADD	16406	23645
COORDS	16438	23677
COORDS (Byte 2)	16439	23678
DEST	16402	23629
DF CC	16398	23684
D FILE	16396	No Equivalent
DF SZ	16418	23659
E LINE	16404	23641
ERR NR	16384	23610
E PPC	16294	23625
ERR SP	16386	23613
FLAGS	16385	23611
FLAGX	16429	23665
FRAMES	16436	23672
LAST K	16421	23560
MARGIN	16424	No Equivalent
MEM	16415	23656
MEMBOTT	16477	23698
MODE	16390	23617
NXTLIN	16425	23637
OLDPCC	16427	23662
PPC	16391	23621
PRBUFF	16444	23296
PR CC	16440	23680
RAMTOP	16388	23730
SEED	16434	23670
S PSN	16441	23688
S POSN (Byte 2)	16442	23689
STKBOT	16410	23651
STKEND	16412	23653
S TOP	16419	23660
STRLEN	16430	23666
T-ADDR	16432	23668
VARS	16400	23627
VERSN	16393	No Equivalent
X PTR	16408	23647



TOP SECRET

John Amphlett, masterspy of Haverfordwest, gives us a means of keeping our secrets safe!

This secret message encoding/decoding program (16K SPECTRUM) combines a high degree of security with ease of operation. The main features are:-

A) The original clear message consists of capital letters, spaces and full stops, making an "alphabet" of 28 characters.

B) The coded message, which has the same length as the clear original, uses 52 characters, 26 normal and 26 underlined capital letters. This method of distinguishing the second half of the coded character set was chosen because both the Spectrum and the typewriter can easily underline already printed characters in the same print position.

C) The elements of the original message are changed to coded ones by shifting the ZX character codes up and around the alphabet "circle". This is done by adding a variety of fixed and randomly chosen integers to the codes then subtracting the necessary multiples of 26. Decoding is performed in the opposite direction.

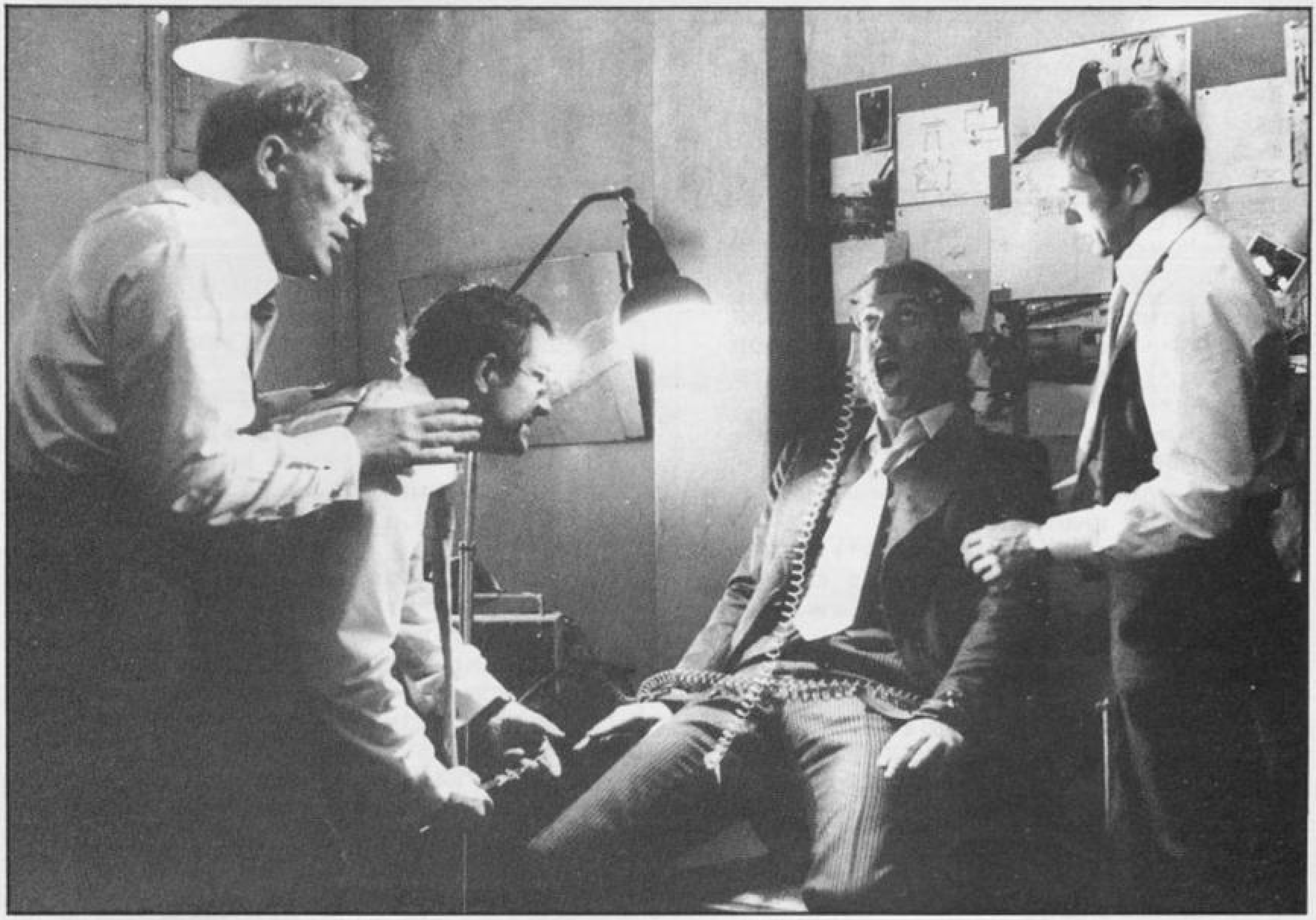
D) The special feature of this program, and one that really makes such high security possible, is that one of these integers is the ZX code of the already processed previous element. this means that the value of a coded element depends partly on the value of its immediate predecessor and therefore the whole coded message is made much more difficult to break.

On running the program, the operator is asked to enter the Code Number (which controls the RANDOMIZE function), the Code Letter (which becomes the first integer to be added to the first element) and the Station Number (the number of the originating operator). Then he must enter "E" or "D" for the encode or decode mode. Next he types in the message, clear or coded as appropriate, and after pressing ENTER the processed message is displayed on the screen. Finally, after the result is verified, both original and processed messages are displayed together.

For those readers who are interested in programming techniques here is a brief description of the program. The first section (lines 10 to 60) sets up some of the fixed variables and gives the initial input prompts. Line 60 ensures that the appropriate clear and coded messages appear on the screen on the right lines by means of variables E and D. The second section (lines 85 to 140) uses the familiar "typewriter" routine to enter the original message. The important part of this section is the OVERprinting routine in line 120 which adds an underline character U$ to a previously printed normal letter when the decode mode is operating. This is done simply by pressing the "0" key immediately after the letter so to be treated. Mistakes can be rectified by pressing the "5" key (line 115) then typing in the correct letter. Repeated pressing of the "5" key will erase letters as far back as you wish. Line 110 provides a BEEP sound when typing and an "end of message" signal which triggers the jump out of the typing loop. The message is printed out on the screen as you go and is also concatenated in B$ in line 125 and subsequently transferred to M$ for use in either of the next two sections. B$ is returned to a null string while 0$ is held ready for the final display.



The encoding section (lines 200 to 275) takes each element of M$ in turn, carries out the arithmetic, adds an underline where appropriate and types out the coded result along the encoding line on the screen. First, the RANDOMIZE function and the variable T (the code of the "previous" element) are set outside the encoding loop and the random number generator and the variable U (the underline signal) are set inside. Then the two extra characters, the space (code 32) and the full stop (code 46), are given code numbers immediately before the beginning of the letter alphabet (codes 63 and 64 respectively) by line 225. Then, line 230 makes all the even numbers except 90 change U to zero whilst all the odd numbers except 63 are left set to unity. The reason for this is that the letters Y and Z will, after the reverse arithmetic procedure in the decode mode, end



up with codes 63 and 64 the same as the space and full stop and will therefore be incorrectly decoded. Hence the Y and Z are given the underline signal and will have an extra 26 added in line 355. The next three lines perform the necessary arithmetic and in line 250 the value of T is changed to that of the new A and used next time round the loop. Line 255 adds the underline character to the appropriate coded element. The message is printed out on the encoding line on the screen letter by letter, and B$ collects them in a string as before. The last two lines in this section sort out what happens next, line 275 passes the coded message to M$ for use in the next section for the verification routine and to P$ for use in the final section, while line 270 operates in the decode mode and passes straight to the final section.

Decoding

The decode section (lines 300 to 375) has the same pattern as the encode section so that most of the action is similar. There is, however, one major difference. The coded message M$ is printed near the bottom of the screen and SCREEN$ picks up the elements one by one in line 325. Where there is an underlined character, it is not recognised in line 330. The underline is cancelled by being reprinted, U is changed to unity and the program refers back to line 325 when the normal letter is now recognised and processed. It may be argued that the use of SCREEN$ is a rather clumsy way of doing things. It would be much simpler and neater to use M$(X) directly. I agree, but it is much more fun to watch those underlinings disappear one by one when the decoding section is working. The final section (lines 400 to 420) clears the screen and displays both the original and processed messages in full.

Although the programs as it stands works well, there is a limitation. Only one line of 31 characters can be dealt with at one time. However, it should be fairly easy to make a few necessary alterations to the print statements to get over that. Other improvements spring to mind such as multiple coding, speedier action (approximately 12 seconds a line at the moment), expanding the character vocabulary and so on. Perhaps it is better to leave it to others to develop these ideas. . .

Variables

A$	elements of M$	A	arithmetic process
B$	concatentation of A$	B	= A/2 (odd or even)
E$	encode/decode input	D	decode
L$	code letter	E	encode
M$	complete message	N	code number
O$	original message	R	random number
P$	processed message	S	station number
U$	underline character	T	"addition" number
V$	continue prompt	U	underline signal
Z$	one line of spaces	X	loop control

(CHR$ 8 = back space CHR$ 128 = blank space)

```
   10 REM SETTING-UP SECTION
   15 INPUT "ENTER CODE NUMBER (1
 TO 9)"''N:      PRINT "CODE NUMBE
R IS ";N
   20 INPUT "ENTER CODE LETTER (A
 TO Z)"''L$:     PRINT "CODE LETTE
R IS ";L$
   25 INPUT "ENTER STATION NUMBER
"''S: PRINT "STATION NUMBER IS "
;S
   30 LET B$="": LET U$="_"
   35 LET Z$="                    "
```



```
  4Ø LET Z$=Z$+Z$
  45 INPUT "ENCODE (E) OR DECODE
 (D)?"''E$:   PRINT "PROGRAM MOD
E IS ";("ENCODE" AND E$="E")+("D
ECODE" AND E$="D")
  5Ø PAUSE 2Ø: PRINT '"NOW TYPE
IN YOUR MESSAGE"
  55 PAUSE 2Ø: PRINT "   (PRESS
ENTER AT END)"
  6Ø LET E=(1Ø AND E$="E")+(12 A
ND E$="D"): LET D=(12 AND E$="E"
)+(1Ø AND E$="D"): PAUSE 2Ø

  85 REM TYPING SECTION
  9Ø PRINT '"*";
  95 IF INKEY$<>"" THEN  GO TO 9
5
 1ØØ IF INKEY$="" THEN  GO TO 1Ø
Ø
 1Ø5 LET A$=INKEY$: OVER 1
 11Ø BEEP .Ø5,3Ø: IF CODE A$=13
THEN  GO TO 135
 115 IF A$="5" THEN  LET A$=CHR$
 8+CHR$ 128+CHR$ 8: LET B$=B$( T
O LEN B$-1): OVER Ø: GO TO 13Ø
 12Ø IF A$="Ø" THEN  LET A$=CHR$
 8+U$
 125 LET B$=B$+A$
 13Ø PRINT A$;: GO TO 95
 135 LET M$=B$: LET O$=B$
 14Ø IF E$="D" THEN  GO TO 3ØØ

 2ØØ REM ENCODING SECTION
 2Ø5 PRINT AT E,Ø;"*": LET B$=""
 21Ø RANDOMIZE N: LET T=CODE L$
 215 FOR X=1 TO LEN M$: LET U=1
 22Ø LET R=INT (RND*16):   LET A
=CODE M$(X)
 225 LET A=63*(A=32)+64*(A=46)+A
*(A>=65): LET B=A/2
 23Ø LET U=2*(A=9Ø)+(A=63)+(A>=
64 AND A<=88 AND B=INT B)-1
 235 LET A=A+R+S+T+6
 24Ø LET A=A-26
 245 IF A>9Ø THEN  GO TO 24Ø
 25Ø LET T=A: LET A$=CHR$ A
 255 IF U THEN  LET A$=A$+CHR$ 8
+U$
 26Ø LET B$=B$+A$
 265 PRINT AT E,X;A$: NEXT X
 27Ø IF E$="D" THEN  PRINT  OVER
Ø;AT 5,Ø;Z$; BRIGHT 1;AT 5,Ø;"P
RESS ENTER TO FINISH"; BRIGHT Ø:
 INPUT V$: GO TO 4ØØ
 275 LET M$=B$: LET P$=B$: PRINT
 OVER Ø;AT 5,Ø;Z$;AT 6,Ø;Z$; BR
IGHT 1;AT 5,Ø;"PRESS ENTER TO VE
RIFY"; BRIGHT Ø: INPUT V$: PRINT
 OVER Ø;AT 5,Ø;Z$

 3ØØ REM DECODING SECTION
 3Ø5 PRINT AT D,Ø;"*";AT 2Ø,Ø;"*
";M$: LET B$=""
 31Ø RANDOMIZE N: LET T=CODE L$
 315 FOR X=1 TO LEN M$: LET U=Ø
 32Ø LET R=INT (RND*16)
 325 LET A$=SCREEN$ (2Ø,X)
 33Ø IF A$="" THEN  PRINT AT 2Ø,
X;U$: LET U=1: GO TO 325
 335 LET A=CODE A$
 34Ø IF A=32 THEN  GO TO 375
 345 LET A=A-R-S-T-6
 35Ø LET A=A+26: LET T=CODE A$
 355 IF A<63 OR U AND (A=63 OR A
=64) THEN  GO TO 35Ø
 36Ø LET A=32*(A=63)+46*(A=64)+A
*(A>=65)
 365 LET A$=CHR$ A: LET B$=B$+A$
 37Ø PRINT AT D,X;A$: NEXT X
 375 IF E$="D" THEN  LET M$=B$:
LET P$=B$: PRINT  OVER Ø;AT 5,Ø;
Z$;AT 6,Ø;Z$; BRIGHT 1;AT 5,Ø;"P
RESS ENTER TO VERIFY"; BRIGHT Ø:
 INPUT V$: PRINT  OVER Ø;AT 5,Ø;
Z$: GO TO 2ØØ
 38Ø PRINT  OVER Ø;AT 5,Ø;Z$; BR
IGHT 1;AT 5,Ø;"PRESS ENTER TO FI
NISH"; BRIGHT Ø: INPUT V$

 4ØØ REM FINAL SECTION
 4Ø5 PAUSE 1Ø: CLS
 41Ø PRINT AT 4,Ø;"MESSAGE INPUT
";AT 6,Ø;"*";O$
 415 PRINT AT 9,Ø;"MESSAGE OUTPU
T";AT 11,Ø;"*";P$
 42Ø PAUSE 5Ø: PRINT  BRIGHT 1;A
T 17,8;"END OF PROGRAM": STOP

 5ØØ CLS : LIST : STOP
 5Ø5 SAVE "A" LINE 5ØØ
```

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